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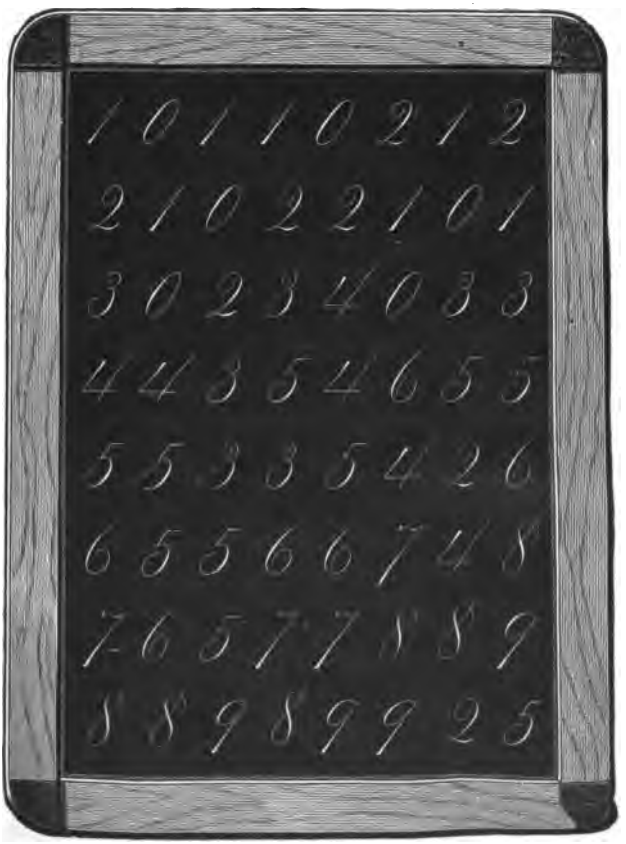
TO THE PUPIL.

Practice *copying*, from this picture of a slate, all the figures, in the order in which they are arranged, until you can write them rapidly, and as neatly as they are made here.



PREFACE

THIS little book is designed to supply a demand for a *complete Table-Book*, and also copious slate and blackboard exercises for the *lower*, as well as for the more *advanced primary* grades.

The drudgery of memorizing abstract tables has been avoided, by applying them to a great number and variety of exercises, both oral and written.

Slate and *blackboard* exercises and drills, in connection with *oral*, are important *from the first*, and if properly conducted will never fail to attract and interest the young learner.

Pictorial illustrations are sparsely introduced, since it is believed that the slate, the blackboard, the numeral frame, and other material objects at the command of the teacher will serve a better purpose in aiding the pupil to understand the first lessons in the use of numbers, than pictures, however numerous and beautiful they may be; and the space usually devoted to pictures will be far better utilized by substituting a variety of exercises, both oral and written, that will make the pupil quick and accurate in calculation.

Such a book cannot take the place of the *living teacher*. Only a few *hints*, *model examples* and *exercises* can be given to aid the teacher in supplying such additional exercises, both oral and written, on almost every page, as the circumstances and the capacity of the pupil will allow. The *how* and the *why* can be more satisfactorily supplied by the teacher than by the author in so limited a space.

All, who are well drilled in this book, will need to spend but little time in the *elementary* principles and applications of the written arithmetic that follows.

COLUMBIA, Mo., Aug., 1881.

COUNTING

Lesson I.

1. How many balls are one ball and one ball? Two balls and one ball? Three balls and one ball? Four and one more? Name five objects. Count ***Five.***

2. Five girls less one girl are how many girls? Four less one are how many? Three less one? Two less one? One less one?

3. Five boys and one boy are how many boys? Six boys and one more? Seven cents and one more? Eight cents and one more? Nine and one more? Name ten objects. Count ***Ten.***

4. How many cents are ten cents less one cent? Nine cents less one cent? Eight less one? Seven less one? Six less one?

5. Ten hats and one hat are how many hats? Eleven things and one thing are how many things? Twelve and one more? Thirteen and one more? Fourteen and one? Count ***Fifteen.***

6. Fifteen blocks less one block are how many blocks? Fourteen less one? Thirteen less one? Twelve less one? Eleven less one?

7. Fifteen books and one book are how many books? Sixteen and one? Seventeen and one? Eighteen and one? Nineteen and one? Count ***Twenty.***

8. Count from one to eight. From five to twelve. From nine to sixteen. From seven to fifteen. From eleven to twenty. From one to twenty.

Lesson II.

DEFINITIONS.

1. A ***Unit*** is *one,* or a single thing.

Thus, *one* book, *one* hat, *one* pint, or *one,* is a *unit.*

2. A ***Number*** is a unit or a collection of units.

Thus, *one* slate, *three* hats, *six* pounds, *one, three,* or *six,* is a number.

3. ***Like Numbers*** are numbers which express the same kind of quantity or things.

Thus, four *hats* and three *hats,* five *tens* and two *tens,* four and five, are *like numbers.*

4. ***Unlike Numbers*** are numbers which express different kinds of quantity or things.

Thus, five *books* and six *hats,* eight *feet* and nine *days,* three *tens* and four *hundreds,* are *unlike numbers.*

5. ***Figures*** are characters used to express numbers.

Ten figures are used to express numbers:

6. FIGURES: 0 1 2 3 4 5 6 7 8 9

NAMES: *Naught, One, Two, Three, Four, Five, Six, Seven, Eight, Nine.*

7. The figure 0 denotes *nothing,* and has no value when standing alone. It is named *Naught,* or *Zero.*

8. The greatest number that can be expressed by a single figure is *nine,* which represents 9 *units.*

9. 9 and 1 more make ***Ten,*** written *10.*

10. Count by *ones* from one to ten, and write the numbers on your slate:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

11. To express a number of tens, or of tens and units, *two figures* are required.

Lesson III.

1. When a number is expressed by two figures, the figure at the *right* denotes *units* or *ones*, and the figure at the *left* denotes *tens*.

2.	***Eleven***	denotes	1 ten	1 unit,	written	*11.*
3.	***Twelve***	"	1 ten	2 units,	"	*12.*
4.	***Thirteen***	"	1 ten	3 units,	"	*13.*
5.	***Fourteen***	"	1 ten	4 units,	"	*14.*
6.	***Fifteen***	"	1 ten	5 units,	"	*15.*
7.	***Sixteen***	"	1 ten	6 units,	"	*16.*
8.	***Seventeen***	"	1 ten	7 units,	"	*17.*
9.	***Eighteen***	"	1 ten	8 units,	"	*18.*
10.	***Nineteen***	"	1 ten	9 units,	"	*19.*
11.	***Twenty***	"	2 tens	0 units,	"	*20.*

12. Count by *ones* from ten to twenty, and write the numbers on your slate:

10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.

13. Count by *ones* from twenty to thirty, and write the numbers on your slate:

20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30.

14.	***Thirty***	denotes	3 tens,	written	*30.*
15.	***Forty***	"	4 tens,	"	*40.*
16.	***Fifty***	"	5 tens,	"	*50.*
17.	***Sixty***	"	6 tens,	"	*60.*
18.	***Seventy***	"	7 tens,	"	*70.*
19.	***Eighty***	"	8 tens,	"	*80.*
20.	***Ninety***	"	9 tens,	"	*90.*

21. The greatest number that can be expressed by two figures is *ninety-nine*, which represents 9 *tens* 9 *units*.

22. 99 and 1 more make **One hundred**, written 100.

Lesson IV.

1. Count by *ones* from thirty to forty, and write the numbers on your slate. From forty to fifty. From fifty to sixty. From sixty to seventy. From seventy to ninety. From ninety to one hundred.

2. What do the figures 64 denote?

Ans. 6 *tens* 4 *units;* read, *sixty-four.*

3. What do the figures 87 denote?

Ans. 8 *tens* 7 *units;* read, *eighty-seven.*

4. Copy and read the following numbers, naming the *tens* and *units* in each:

24	63	75	59	84	83	69
36	29	67	47	77	96	88
45	56	81	27	90	71	49
54	29	66	74	78	44	99

5. Express by *figures* the following numbers:

Seventy.	Seventy-eight.	Twenty-seven.	Eighty-eight.
Thirty-three.	Ninety-nine.	Forty-two.	Fifty-three.
Forty-eight.	Forty-three.	Eighty-one.	Ninety-five.
Sixty-two.	Sixty-nine.	Seventy-seven.	Sixty-seven.
Fifty-five.	Eighty-six.	Ninety-six.	Forty-nine.
Twenty-nine.	Thirty-five.	Fifty-eight.	Ninety-one.

6. Name the two numbers that can be expressed by combining 3 and 4. *Ans.* 34 and 43.

7. Write and name the numbers that can be expressed by combining:

2 and 6.	7 and 6.	4 and 8.	9 and 1.
3 and 8.	2 and 9.	6 and 1.	4 and 5.
7 and 5.	5 and 8.	2 and 9.	8 and 7.
6 and 4.	*9 and 5.*	1 and 7.	6 and 9.

Lesson V.

1. To express a number of hundreds, or of hundreds, tens, and units, at least *three* figures are required.

2. When a number is expressed by three figures, the figure at the right denotes *units*, the middle figure denotes *tens*, and the figure at the left denotes *hundreds*.

3.	***One hundred***	denotes	10 tens,	written	*100.*
4.	***Two hundred***	"	20 tens,	"	*200.*
5.	***Three hundred***	"	30 tens,	"	*300.*
6.	***Four hundred***	"	40 tens,	"	*400.*
7.	***Five hundred***	"	50 tens,	"	*500.*
8.	***Six hundred***	"	60 tens,	"	*600.*
9.	***Seven hundred***	"	70 tens,	"	*700.*
10.	***Eight hundred***	"	80 tens,	"	*800.*
11.	***Nine hundred***	"	90 tens,	"	*900.*

12. The greatest number that can be expressed by three figures is *nine hundred ninety-nine*, which expresses 9 *hundreds* 9 *tens* 9 *units*.

13. 999 and 1 more make ***one thousand,*** *1000.*

14. Count by *ones* from one hundred to one hundred ten, and write the numbers on your slate, thus:

100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110.

15. In the same manner, count and write from one hundred ten to one hundred twenty-five:

110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125.

16. In the same manner, count and write the numbers from one hundred twenty-five to two hundred.

17. What do the figures 234 denote?

Ans. 2 *hund.* 3 *tens* 4 *units*; read, Two hund. thirty-four.

18. Read the following numbers, naming the *hundreds, tens,* and *units* of each :

105	732	193	277	487	923	456
462	560	656	929	206	804	564

19. Express by *figures* the following numbers :

Two hundred seventy-two.	Nine hundred twenty-seven.
Six hundred forty-six.	Seven hundred eighty-three.
One hundred ninety-one.	Two hundred eighteen.
Eight hundred fourteen.	Four hundred eight.
Three hundred sixty-five.	Six hundred sixty.
Five hundred fifty-seven.	Nine hundred ninety-nine.

Lesson VI.

1. To express a number of thousands, or of thousands, hundreds, tens, and units, at least *four* figures are required.

2. When a number is expressed by four figures, the first figure on the right is *units,* the next toward the left is *tens,* the next *hundreds,* and the next, or fourth, *thousands.*

3. ***One thousand*** denotes 10 hundreds, written *1000.*
4. ***Two thousand*** " 20 hundreds, " *2000.*
5. ***Three thousand*** " 30 hundreds, " *3000.*
6. ***Four thousand*** " 40 hundreds, " *4000.*
7. ***Five thousand*** " 50 hundreds, " *5000.*
8. ***Six thousand*** " 60 hundreds, " *6000.*
9. ***Seven thousand*** " 70 hundreds, " *7000.*
10. ***Eight thousand*** " 80 hundreds, " *8000.*
11. ***Nine thousand*** " 90 hundreds, " *9000.*

12. The greatest number that can be expressed by four figures is *nine thousand nine hundred ninety-nine,* which expresses 9 *thousands* 9 *hundreds* 9 *tens* 9 *units.*

13. 9999 and 1 more make ***ten thousand,*** *10000.*

14. What does the unit 1 denote when it stands alone? With *one* 0 on the right of it? With *two* 0's on the right of it? With *three* 0's on the right?

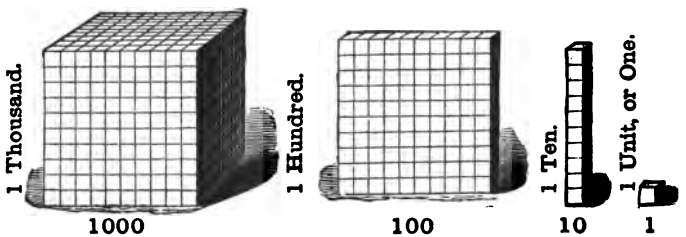


TABLE.

10 Units (1)	make	1 Ten, ...	10.
10 Tens (10)	"	1 Hundred, . .	100.
10 Hundreds (100)	"	1 Thousand, . .	1000.
10 Thousands (1000)	"	1 Ten-thousand,	10000.

15. What do the figures 3265 denote?

Ans. 3 *thousands* 2 *hundreds* 6 *tens* 5 *units;* read, *Three thousand two hundred sixty-five.*

16. What do the figures 4080 denote?

Ans. 4 *thousands* 0 *hundreds* 8 *tens* 0 *units;* read, *Four thousand eighty.*

17. What do the figures 7300 denote?

Ans. 7 *thousands* 3 *hundreds* 0 *tens* 0 *units;* read, *Seven thousand three hundred.*

18. Copy and read the following.

1475	7520	5631	9108	1976
3219	4107	8175	3007	8040
6039	2950	6309	5892	4371
5727	3719	2094	6090	3010

19. Express by *figures* the following numbers:

Two thousand five hundred.	Five thousand twelve.
Six thousand three hundred.	Nine thousand eighty-four.
Four thous. two hundred ten.	Three thous. twenty-nine.
Seven thous. three hundred six.	Six thousand seventy.
Five thousand seven hundred sixty-seven.	One thousand nine hund. eighteen.

Lesson VII.

1. ***Notation*** is a method of expressing numbers by figures or other characters.

2. Expressing numbers by figures is called the ***Arabic Method.***

3. ***Numeration*** is a method of reading numbers, expressed by figures or other characters.

4. ***Orders of Units*** are the places in a number, beginning at the right, and numbering toward the left.

Thus, in the number 2465, 5 denotes *ones*, or units of the *first* order; 6 denotes *tens*, or units of the *second* order; 4 denotes *hundreds*, or units of the *third* order; and 2 denotes *thousands*, or units of the *fourth* order.

5. Ten units of any order make one unit of the next higher order.

6. A ***Period*** is a group of three orders of units, counting from right to left. Thus,

The *First Period*, called the period of *Units*, is formed of the first, second, and third orders of units, comprising units, tens, and hundreds.

The *Second Period*, called the period of *Thousands*, is formed of the fourth, fifth, and sixth orders of units, comprising thousands, ten-thousands, and hundred-thousands.

The *Third Period* is called the period of *Millions*; the *Fourth Period, the period of Billions*, etc., as shown in the following table:

TABLE.

PERIODS.	4th. Billions.			3d. Millions.			2d. Thousands.			1st. Units.		
NAMES OF ORDERS OF UNITS.	Hund.-Bills.	Ten-Bills.	Billions.	Hund.-Mills.	Ten-Mills.	Millions.	Hund.-Thous.	Ten-Thous.	Thousands.	Hundreds.	Tens.	Units.
ORDERS.	12th.	11th.	10th.	9th.	8th.	7th.	6th.	5th.	4th.	3d	2d.	1st.
Numbers to be read.												1
											1	0
										1	0	0
									1	0	0	0
								1	0	0	0	0
							1	0	0	0	0	0
						1	0	0	0	0	0	0
					1	0	0	0	0	0	0	0
				1	0	0	0	0	0	0	0	0
			1	0	0	0	0	0	0	0	0	0
		1	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0
Numbers to be copied and read.										3	2	5
									1	4	0	6
								2	8	5	2	0
							6	4	0	0	8	7
						3	1	0	9	6	1	8
					8	2	0	0	7	0	5	6
				4	0	0	3	1	0	9	0	0
			8	1	5	0	0	7	5	0	6	7
		5	6	0	4	3	9	0	2	3	4	0
	7	1	2	0	0	0	4	5	0	2	0	0

Lesson VIII.

Copy, separate into periods, and *read* the following:*

1. 4703; 23642; 816032; 1904035; 42630240.
2. 60400158; 713000507; 204030621; 9800752.
3. 7361004; 20376521; 84500; 4600320189.
4. 1428003; 650370; 38042000125; 91060028140.
5. 3330040132; 8104532; 24630001890; 70000036204.
6. 92032065; 28019000; 600391042000; 3415000189.
7. Write the numbers in each preceding line in columns, so that units shall stand under units, tens under tens, etc.

Express the following numbers by *figures:*

8. Sixty-one thousand eight hundred twenty-nine.
9. Nine hundred eight thousand seven hundred thirty-six.
10. Three hundred twenty-nine thousand five hundred.
11. Four million eighty-two thousand six hundred ten.
12. Fifty-one million nine thousand seven hundred twelve.
13. One hundred fifty million seven thousand ninety.
14. Six hundred five bill. eight hundred thous. six hund.

Lesson IX.

1. The ***Roman Method*** of Notation employs seven letters and a *dash* in expressing numbers.

2. LETTERS: I, V, X, L. C, D, M.
   VALUES: 1, 5, 10, 50, 100, 500, 1000.

3. Repeating a letter repeats its value.
Thus, XX represents 20; CCCC, 400; DD, 1000.

4. A dash or line (‾) placed over a letter increases its value a *thousand times.*
Thus, $\overline{X}$ represents ten *thousand;* $\overline{L}$, fifty *thousand.*

* *Apply the preceding* table to the exercises in this lesson.

TABLE OF ROMAN NOTATION.

Roman.		*Script.*	*Roman.*		*Script.*	*Roman.*		*Script.*
I	=	*1*	XVII	=	*17*	L	=	*50*
II	=	*2*	XVIII	=	*18*	LX	=	*60*
III	=	*3*	XIX	=	*19*	LXX	=	*70*
IV	=	*4*	XX	=	*20*	LXXX	=	*80*
V	=	*5*	XXI	=	*21*	XC	=	*90*
VI	=	*6*	XXII	=	*22*	C	=	*100*
VII	=	*7*	XXIII	=	*23*	CC	=	*200*
VIII	=	*8*	XXIV	=	*24*	CD	=	*400*
IX	=	*9*	XXV	=	*25*	D	=	*500*
X	=	*10*	XXVI	=	*26*	DC	=	*600*
XI	=	*11*	XXVII	=	*27*	CM	=	*900*
XII	=	*12*	XXVIII	=	*28*	M	=	*1000*
XIII	=	*13*	XXIX	=	*29*	MC	=	*1100*
XIV	=	*14*	XXX	=	*30*	$\overline{X}$	=	*10000*
XV	=	*15*	XXXI	=	*31*	$\overline{L}$	=	*50000*
XVI	=	*16*	XL	=	*40*	$\overline{C}$	=	*100000*

EXERCISES.

5. Name the numbers expressed by the letters:

XXXIX.	XLV.	LXXV.	CCC.	DCCCXC.
XIV.	XLVI.	LXIX.	CCCX.	CMLXV.
XXVI.	LIX.	LXXXIII.	DL.	MCCLXX.
XXXIX.	LV.	XCV.	DCLX.	$\overline{LX}\overline{X}$CCC.
XXIX.	XLIX.	XCIX.	CDXL.	$\overline{CXV}$.

6. Express by *letters* the following numbers:

29	55	77	120	250	1250	25000
36	59	89	141	384	1500	97000
38	66	95	159	449	1340	50645
47	68	99	196	636	2655	75000

ADDITION AND SUBTRACTION

Lesson X.

1. ***Addition,*** ~~or adding~~, is ~~the process of~~ uniting two or more numbers of the same kind into one. The result is called the ***Sum.*** Thus, 10 is the *sum* of 6 and 4.

2. ***Subtraction,*** ~~of subtracting~~, is ~~the process of~~ finding how much greater one number is than another of the same kind.

3. The *greater* of the two numbers compared is called the ***Minuend.***

4. The *lesser* is called the ***Subtrahend.***

5. The result is called the ***Difference,*** or ***Remainder.***

Thus, 6 is the *difference* between 10 and 4; or, 4 cents taken from 10 cents, the *remainder* is 6 cents.

6. A ***Sign*** in Arithmetic is a character that indicates what is to be done.

7. The ***Sign of Addition*** is +. It is read *and,* or *plus,* and signifies *more.*

Thus, 6+4 shows that 4 is to be *added* to 6, and is read, 6 *and* 4, or 6 *plus* 4.

8. The ***Sign of Subtraction*** is —. It is read *minus,* and signifies *less.*

Thus, 6—4 shows that 4 is to be *subtracted,* or *taken from* 6, and is read, 6 *minus* 4, or 6 *less* 4.

9. The ***Sign of Equality*** is =. It is read *are,* or *equals.*

Thus. 6+4 = 10 is read, 6 *and* 4 *are* 10, or 6 *plus* 4 *equals* 10.

Lesson XI.

PRACTICAL SUGGESTIONS.

1. The pupil should memorize each table, both in the *direct* and in the *inverse* order of the numbers; thus,

In Addition, 2 and 6 are 8, 6 and 2 are 8, etc.

In Subtraction, 2 from 8 leaves 6, 6 from 8 leaves 2, etc.

In Multiplication, 2 times 4 are 8, 4 times 2 are 8, etc.

In Division, 2 in 8, 4 times; 4 in 8, 2 times; etc.

2. The exercises in the use of signs, on the right of the tables, and elsewhere, may first be copied by the pupil, and the *answers written;* afterward, the teacher may use them as *dictation* exercises, varying and increasing them at his option.

3. The exercises for the slate and board are to be copied, and the results written underneath; then erased and renewed until they can be promptly given from *memory.*

4. Then similar exercises may be placed on the board, and the teacher pointing from one set of numbers to another, the pupil or class should be able to name instantly the result, giving the *sum,* the *difference,* the *product,* or the *quotient,* as required. This is sometimes called Addition, Subtraction, Multiplication, or Division *at sight.*

5. In a book of this size, little more than *models* for *oral* and *slate* exercises, to be used after each table, can be given; hence, the teacher is expected to supply such additional *oral* and *written* exercises, as seem adapted to the progress and capacity of the pupil, and until the tables are thoroughly memorized.

6. The pupil should be thoroughly drilled, after each table, in exercises on the slate and board, in *counting,* or adding, by *twos, threes, fours, fives, sixes,* etc.

Lesson XII.

2	and	1	are	3	2	from	2	leaves	0	4 + 2 − 1 = ?
2	"	2	"	4	2	"	3	"	1	6 − 2 + 1 = ?
2	"	3	"	5	2	"	4	"	2	9 − 2 + 0 = ?
2	"	4	"	6	2	"	5	"	3	2 + 8 + 2 = ?
2	"	5	"	7	2	"	6	"	4	10 + 2 + 1 = ?
2	"	6	"	8	2	"	7	"	5	7 − 2 − 2 = ?
2	"	7	"	9	2	"	8	"	6	11 − 2 + 1 = ?
2	"	8	"	10	2	"	9	"	7	9 + 2 + 2 = ?
2	"	9	"	11	2	"	10	"	8	2 + 11 − 2 = ?
2	"	10	"	12	2	"	11	"	9	5 − 2 − 0 = ?
2	"	11	"	13	2	"	12	"	10	10 − 2 − 2 = ?
2	"	12	"	14	2	"	13	"	11	12 + 2 − 1 = ?

When the mark (?) is placed after the sign =, thus, = ?, it is read, *equals how many?* or *what?*

Thus, 6+4 = ? is read, 6 *plus* 4 *equals how many?* or *what?* and writing the *sum* in place of "?", we have 6+4 = 10.

Slate Exercises.

1. Copy and give the *sum* of each set of numbers:

3	6	8	4	7	5	10	9	12	11	2
2	2	2	2	2	2	2	2	2	2	2

2. Copy the following, and find the *difference* of each set:

4	2	5	3	10	6	9	7	11	8	12
2	2	2	2	2	2	2	2	2	2	2

Oral Exercises.

How many are

1. 6 boys and 2 boys?
2. 6 books less 2 books?
3. 7 benches and 2 benches?

How many are

4. 2 hours and 9 hours?
5. 8 pages less 2 pages?
6. 11 words less 2 words?

Lesson XIII.

3	and	1	are	4	3	from	3	leaves	0	3	+	5	−	2 = ?
3	"	2	"	5	3	"	4	"	1	4	−	3	+	6 = ?
3	"	3	"	6	3	"	5	"	2	7	+	3	−	1 = ?
3	"	4	"	7	3	"	6	"	3	3	+	8	−	2 = ?
3	"	5	"	8	3	"	7	"	4	9	+	3	−	2 = ?
3	"	6	"	9	3	"	8	"	5	10	+	2	−	3 = ?
3	"	7	"	10	3	"	9	"	6	3	+	11	−	2 = ?
3	"	8	"	11	3	"	10	"	7	12	+	0	−	3 = ?
3	"	9	"	12	3	"	11	"	8	7	−	3	+	2 = ?
3	"	10	"	13	3	"	12	"	9	11	−	3	+	1 = ?
3	"	11	"	14	3	"	13	"	10	13	−	3	−	2 = ?
3	"	12	"	15	3	"	14	"	11	15	−	3	+	2 = ?

Slate Exercises.

1. Add	4	7	3	5	2	10	8	11	9	6	12
	3	3	3	3	3	3	3	3	3	3	3
2. From	5	3	7	4	8	10	6	9	11	13	12
Subtract	3	3	3	3	3	3	3	3	3	3	3

Oral Exercises.

How many are

1. 7 cows and 3 cows?
2. 3 words and 8 words?
3. 5 sheep and 3 sheep?
4. 9 horses and 3 horses?
5. 3 dogs and 10 dogs?
6. 12 birds and 3 birds?
7. 3 cats and 11 cats?

How many are

8. 6 hens less 3 hens?
9. 8 eggs less 3 eggs?
10. 7 figs less 3 figs?
11. 10 lemons less 3 lemons?
12. 5 pears less 3 pears?
13. 11 tops less 3 tops?
14. 12 pens less 3 pens?

15. How many are 8 units less 2 units? 7 tens and 2 tens?

SLATE EXERCISES.

Add, or count by 2's:*

(1.)	(2.)	(3.)	(4.)
2	2	2	1
2	2	2	0
2	2	1	2
2	2	2	1
2	2	1	2
2	1	2	2

Add, or count by 3's:

(5.)	(6.)	(7.)	(8.)
3	3	3	3
3	3	3	2
3	3	3	3
3	2	3	1
3	3	3	2
3	1	2	2

9. Count by 3's to 15. *Ans.* 3, 6, 9, 12, 15.

10. Count by 3's from 15 back to 0. *Ans.* 15, 12, 9, 6, 3.

11. Count by 3's from 1 to 16; from 16 back to 1.

12. Count by 3's from 2 to 20; from 20 back to 2.

Lesson XIV.

4	and	1	are	5	4	from	4	leaves	0	8	−	4	+ 1	= ?
4	"	2	"	6	4	"	5	"	1	6	+	4	− 3	= ?
4	"	3	"	7	4	"	6	"	2	4	+	9	− 2	= ?
4	"	4	"	8	4	"	7	"	3	10	−	4	+ 3	= ?
4	"	5	"	9	4	"	8	"	4	9	−	3	+ 4	= ?
4	"	6	"	10	4	"	9	"	5	4	+	11	− 2	= ?
4	"	7	"	11	4	"	10	"	6	8	−	3	+ 4	= ?
4	"	8	"	12	4	"	11	"	7	12	−	4	+ 3	= ?
4	"	9	"	13	4	"	12	"	8	3	+	10	− 4	= ?
4	"	10	"	14	4	"	13	"	9	11	+	4	− 3	= ?
4	"	11	"	15	4	"	14	"	10	10	−	3	+ 4	= ?
4	"	12	"	16	4	"	15	"	11	14	−	4	+ 2	= ?

* The pupil should add as he counts; thus, *two, four, six, eight, ten,* etc.; and in the second column, *one, three, five, seven, nine,* etc. This exercise may be extended to *twenty, thirty, fifty,* or more, as the *teacher thinks proper.*

SLATE EXERCISES.

Addition at Sight.

2	6	3	5	11	4	8	10	9	12	7
4	4	4	4	4	4	4	4	4	4	4

Subtraction at Sight.

5	7	4	9	12	8	6	13	10	14
4	4	4	4	4	4	4	4	4	4

ORAL EXERCISES.

1. How many are 4 ones and 6 ones? 5 quarts and 4 quarts? 9 tens and 4 tens? 10 pounds less 4 pounds?

2. How many are 8 cents less 4 cents? 7 cents less 3 cents?

3. How many are 2 and 4 and 3? 4 from 9? 11 less 4?

4. A man paid 10 dollars for a coat and 4 dollars for a vest. How much more did the coat cost than the vest?

5. Anna gave 4 cents for an orange, and 6 cents for a spool of thread, and had 5 cents left. How many cents had she at first?

6. Count by 4's from 0 to 16; from 16 back to 0.

7. Count by 4's from 1 to 21; from 21 back to 1.

8. Count by 4's from 2 to 22; from 22 back to 2.

9. Count by 4's from 3 to 27; from 27 back to 3.

FOR THE SLATE OR BOARD.

Addition.					*Subtraction.*				
(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)				
4	4	4	4	4	7	5	8	10	4
4	4	4	4	2	4	3	4	2	4
4	4	4	4	1					
4	4	4	4	3			(7.)		
4	4	4	4	2	9	11	6	12	13
4	1	2	3	4	3	4	2	3	4

Lesson XV.

5 and 1 are 6	5 from 5 leaves 0	3 + 5 − 2 = ?
5 " 2 " 7	5 " 6 " 1	5 + 5 − 4 = ?
5 " 3 " 8	5 " 7 " 2	8 − 5 + 3 = ?
5 " 4 " 9	5 " 8 " 3	10 − 4 + 5 = ?
5 " 5 " 10	5 " 9 " 4	5 + 9 − 3 = ?
5 " 6 " 11	5 " 10 " 5	9 − 5 + 4 = ?
5 " 7 " 12	5 " 11 " 6	11 + 4 − 5 = ?
5 " 8 " 13	5 " 12 " 7	5 + 10 − 2 = ?
5 " 9 " 14	5 " 13 " 8	15 − 5 + 4 = ?
5 " 10 " 15	5 " 14 " 9	7 + 5 + 4 = ?
5 " 11 " 16	5 " 15 " 10	12 − 4 − 5 = ?
5 " 12 " 17	5 " 16 " 11	14 − 5 + 3 = ?

Slate Exercises.

Addition at Sight.

5	3	7	10	4	9	2	11	6	8	12
5	5	5	5	5	5	5	5	5	5	5

Subtraction at Sight.

9	6	10	14	5	11	8	12	7	13
5	5	5	5	5	5	5	5	5	5

Oral Exercises.

1. How many cents are 5 cents and 5 cents? 10 cents and 5 cents? 5 apples and 9 apples? 12 trees less 5 trees? 9 figs less 5 figs? 8 units less 5 units? 7 tens less 5 tens?

2. George had 10 cents and gave 4 cents for an orange; how many cents had he left?

3. Ella went shopping with $12, and returned with $5; *how much did she spend?*

4. A lady bought a bonnet for $8 and a collar for $5; what did she pay for both? How much more for the bonnet than for the collar?

6. A grocer sold 10 pounds of rice to one man, 5 pounds to another, and 4 pounds to another. How many pounds did he sell to all?

7. Count 10 by 5's; 15 by 5's; 20 by 5's; 25 by 5's.

8. Count by 5's from 15 back to 0; from 20 back to 0.

9. Count by 5's from 2 to 17; from 3 to 23; from 4 to 29.

10. Count by 5's from 21 back to 1; from 22 back to 2.

FOR THE SLATE OR BOARD.

Addition.

(1.)	(2.)	(3.)	(4.)	(5.)
5	5	5	5	5
5	5	5	5	5
5	5	5	5	5
5	5	5	5	5
5	5	5	5	5
5	1	2	3	4

Subtraction.

(6.)

9	7	10	6	12
5	3	5	2	5

(7.)

8	12	13	5	15
3	5	4	3	5

Exercises in which the sum of each column, except the left-hand column, does not exceed nine:

(8.)	(9.)	(10.)	(11.)	(12.)	(13.)	(14.)
202	320	142	503	231	411	500
121	132	213	231	420	322	245
332	413	401	420	314	233	320
513	324	322	315	524	112	132

(15.)	(16.)	(17.)	(18.)	(19.)	(20.)
3210	1203	4120	2132	5004	2135
4322	3132	2313	4201	3210	4310
2133	4211	3044	5320	4132	5121
5024	5040	2201	3131	1541	3013

Lesson XVI.

Exercises in which the sum of any, or of each column, may equal or exceed ten: *

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)
1324	3420	2134	5200	3345	4050
5431	2354	4310	3145	5210	3405
2054	4123	3545	4352	4354	5364
3243	5305	2153	2543	1442	2523

(7.)	(8.)	(9.)	(10.)	(11.)
35421	43032	51000	3245	4504
4034	30541	24535	5013	5052
52345	25235	5423	524	435
3520	42342	43254	3240	43

(12.)	(13.)	(14.)	(15.)	(16.)
24324	43015	35104	2430	3420
2225	32542	21453	5007	4056
526	14353	42035	452	847
2523	632	13540	89	95

(17.)	(18.)	(19.)	(20.)	(21.)	(22.)
Pounds.	*Miles.*	*Men.*	*Tons.*	*Feet.*	*Acres.*
3245	1532	4203	425	300	309
1432	5243	521	2354	435	720
2153	325	3240	312	75	84
5414	132	405	5463	657	125

* To the Teacher. Before commencing these exercises, explain to the pupil the method of "*carrying*." This can be done more satisfactorily by the teacher than by the author, in the space allowed.

Exercises for the Slate and Board, to be used in connection with all the tables in Addition and Subtraction, are given on pages 36, 37, and 38.

Lesson XVII.

Exercises in which each figure of the subtrahend is not greater than the corresponding figure of the minuend:

	(1.)	(2.)	(3.)	(4.)	(5.)
Minuend.	7345	4836	6473	9165	2537
Subtrahend.	5021	1423	2143	3123	2105
*Remainder.	2324				

	(6.)	(7.)	(8.)	(9.)
From	9435 men.	3578 acres.	7280 miles.	1875 tons.
Take	2104 "	1234 "	3240 "	1325 "

(10.)	(11.)	(12.)	(13.)	(14.)
53681	95073	77364	27304	49376
21451	81022	32312	21104	48124

† Exercises in which some of the figures in the subtrahend are greater than the corresponding figures in the minuend:

	(15.)	(16.)	(17.)	(18.)	(19.)
From	7362	6423	9347	4265	3124
Take	2435	1255	4532	1340	2435

(20.)	(21.)	(22.)	(23.)	(24.)
53610	23768	76230	25206	43130
24325	14325	12541	14532	42521

(25.)	(26.)	(27.)	(28.)	(29.)
22370	63400	43788	82450	97300
21522	41521	2543	5324	24535

* Prove each result, by adding the remainder to the subtrahend.

† Instruct the pupil in the method of subtracting and "borrowing."

Lesson XVIII.

6	and	1	are	7	6	from	6	leaves	0
6	"	2	"	8	6	"	7	"	1
6	"	3	"	9	6	"	8	"	2
6	"	4	"	10	6	"	9	"	3
6	"	5	"	11	6	"	10	"	4
6	"	6	"	12	6	"	11	"	5
6	"	7	"	13	6	"	12	"	6
6	"	8	"	14	6	"	13	"	7
6	"	9	"	15	6	"	14	"	8
6	"	10	"	16	6	"	15	"	9
6	"	11	"	17	6	"	16	"	10
6	"	12	"	18	6	"	17	"	11

$6 + 7 - 4 = ?$
$9 - 6 + 5 = ?$
$10 - 5 + 6 = ?$
$6 + 9 - 3 = ?$
$11 + 5 - 6 = ?$
$12 - 6 + 4 = ?$
$5 + 11 - 6 = ?$
$14 - 6 - 4 = ?$
$6 + 10 + 5 = ?$
$16 - 6 + 4 = ?$
$9 + 6 - 2 = ?$
$21 + 4 - 6 = ?$

Slate Exercises.

Addition at Sight.

3	9	11	2	12	4	8	5	10	6	7
6	6	6	6	6	6	6	6	6	6	6

Subtraction at Sight.

7	10	8	12	14	9	11	15	13	16
6	6	6	6	6	6	6	6	6	6

Oral Exercises.

1. How many are 6 men and 8 men? 12 men and 6 men? 6 bushels and 11 bushels? 6 tens and 7 tens? 6 hundreds and 5 hundreds? $9 and $6?*

2. How many are 8 units less 6 units? 9 tens less 6 tens? 12 cents less 6 cents? $6 from $15?

* The *Dollar Sign* is $, and is placed *before* the number. Thus, *$6 is read 6 dollars;* $15 is read 15 *dollars;* $9, 9 *dollars*, etc.

3. John had 10 peaches and 6 pears in his basket; how many had he of both?

4. George gave 12 cents for a book, and 6 cents to a beggar, and had 5 cents left; how many cents had he at first?

5. In a car were 14 persons, and 6 of them left; how many remained?

6. A book costs 16 cents, and a slate 6 cents; what is the difference in their cost?

7. A farmer having 15 sheep, sold 6 of them, and afterward bought 4 more; how many had he then?

8. Count by 6's from 0 to 24; from 24 back to 0.

9. Count by 6's from 1 to 31; from 31 back to 1.

10. Count by 6's from 2 to 20; from 20 back to 2.

11. Count by 6's from 3 to 27; from 27 back to 3.

12. Count by 6's from 4 to 22; from 22 back to 4.

FOR THE SLATE OR BOARD.

Addition.

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
6	6	6	6	6	6
6	6	6	6	6	6
6	6	6	6	6	6
6	6	6	6	6	6
6	6	6	6	6	6
6	6	6	6	6	6
6	6	6	6	6	6
6	1	2	3	4	5

Subtraction.

(*7.*)

9	10	7	12	8
6	4	3	5	2

(*8.*)

11	6	13	15	14
5	2	4	6	6

(*9.*)

13	9	14	16	12
5	4	6	5	6

Count

10. By 2's from 0 to 40.
11. By 3's from 0 to 36.
12. By 3's from 2 to 38.
13. By 4's from 0 to 48.
14. By 4's from 3 to 51.
15. By 5's from 0 to 50.
16. By 5's from 2 to 47.
17. By 5's from 4 to 44.
18. By 6's from 0 to 60.
19. By 6's from 5 to 59.

Count back

20. By 2's from 28 to 0.
21. By 3's from 38 to 2.
22. By 4's from 43 to 3.
23. By 4's from 50 to 2.
24. By 5's from 46 to 1.
25. By 5's from 39 to 4.
26. By 6's from 49 to 1.
27. By 6's from 52 to 4.

Lesson XIX.

7 and 1 are 8	7 from 7 leaves 0	5 + 7 − 6 = ?
7 " 2 " 9	7 " 8 " 1	9 − 7 + 6 = ?
7 " 3 " 10	7 " 9 " 2	7 + 9 − 5 = ?
7 " 4 " 11	7 " 10 " 3	12 − 7 + 4 = ?
7 " 5 " 12	7 " 11 " 4	8 + 7 − 6 = ?
7 " 6 " 13	7 " 12 " 5	14 − 7 + 5 = ?
7 " 7 " 14	7 " 13 " 6	8 − 5 + 7 = ?
7 " 8 " 15	7 " 14 " 7	7 + 11 − 3 = ?
7 " 9 " 16	7 " 15 " 8	7 + 12 − 5 = ?
7 " 10 " 17	7 " 16 " 9	15 − 7 − 4 = ?
7 " 11 " 18	7 " 17 " 10	17 − 7 + 6 = ?
7 " 12 " 19	7 " 18 " 11	7 + 10 − 5 = ?

Slate Exercises.

Addition at Sight.

2	9	4	6	3	10	5	8	11	7	12
7	7	7	7	7	7	7	7	7	7	7

Subtraction at Sight.

8	10	12	9	13	7	15	14	16	17
7	7	7	7	7	7	7	7	7	7

1. 12 + 4 − 6 + 2 = ?
2. 9 − 3 + 10 − 4 = ?
3. 7 + 5 − 6 + 11 = ?
4. 18 − 6 − 5 + 7 = ?
5. 5 + 9 + 6 − 10 = ?
6. 20 − 10 + 8 + 7 = ?

ORAL EXERCISES.

How many are	How many are
1. 9 boxes and 7 boxes?	*6.* 15 shoes less 7 shoes?
2. 7 hooks and 8 hooks?	*7.* 7 boots from 13 boots?
3. 11 pegs and 7 pegs?	*8.* 16 nails less 7 nails?
4. 7 saws and 12 saws?	*9.* 7 bells from 12 bells?
5. 7 tens and 7 tens?	*10.* 7 hundreds from 9 hundreds?

11. James had 8 marbles and bought 6 more; he then gave 7 to his brother. How many had he left?

12. Harry bought 20 figs; he ate 6, and gave 5 to his sister; how many figs had he left?

13. Find the difference between 18 and the sum of 9 and 3?

14. From 11 take 7, add 5, take 4, add 7, and name the result?

15. To 7 add 9, subtract 6, add 5, subtract 7; what is the result?

16. Count by 7's from 0 to 21; from 21 back to 0.

17. Count by 7's from 1 to 29; from 29 back to 1.

FOR THE SLATE OR BOARD.

(1.)	*(2.)*	*(3.)*	*(4.)*	*(5.)*	*(6.)*	*(7.)*	*(8.)*	*(9.)*	*(10.)*
7	7	7	7	7	7	7	7	6	3
7	7	7	7	7	7	7	7	5	7
7	7	7	7	7	7	7	7	7	4
7	7	7	7	7	7	7	5	3	7
7	7	7	7	7	7	7	7	7	6
7	7	7	7	7	7	7	7	7	7
7	1	2	3	4	5	6	4	2	5
From 21	14	8	22	10	15	18	20	17	
Take 7	5	4	6	3	7	8	7	8	

Lesson XX.

8	and	1	are	9	8	from	8	leaves	0
8	"	2	"	10	8	"	9	"	1
8	"	3	"	11	8	"	10	"	2
8	"	4	"	12	8	"	11	"	3
8	"	5	"	13	8	"	12	"	4
8	"	6	"	14	8	"	13	"	5
8	"	7	"	15	8	"	14	"	6
8	"	8	"	16	8	"	15	"	7
8	"	9	"	17	8	"	16	"	8
8	"	10	"	18	8	"	17	"	9
8	"	11	"	19	8	"	18	"	10
8	"	12	"	20	8	"	19	"	11

10 − 8 + 7 = ?				
8 + 5 − 7 = ?				
12 − 8 + 6 = ?				
10 + 6 − 8 = ?				
8 + 11 − 7 = ?				
15 − 8 + 6 = ?				
8 − 8 + 17 = ?				
12 + 8 − 5 = ?				
16 − 8 + 3 = ?				
8 + 8 + 10 = ?				
18 − 8 − 5 = ?				
19 − 7 + 8 = ?				

For the Slate or Dictation.

8+4 = ?	5+8 = ?	8+9 = ?	6+8 = ?	8+3 = ?
8+2 = ?	9+8 = ?	11+8 = ?	8+10 = ?	12+8 = ?
10−8 = ?	8−8 = ?	11−8 = ?	14−8 = ?	15−8 = ?
9−8 = ?	13−8 = ?	12−8 = ?	17−8 = ?	16−8 = ?

12+6−5+2 = ? 8+9+3−7 = ?

17−7+9−3 = ? 20−6+4−8 = ?

Oral Exercises.

1. There are 8 peaches on one plate, 6 on another, and 4 on another; how many peaches on the three plates?

2. Harry's father gave him 15 cents, he earned 5 more, and then gave 8 cents for a ball; how many cents had he left?

3. There were 18 pears on a tree, but the wind blew off 4, and a boy stole 4 more; how many pears were left on the tree?

4. Count by 8's from 0 to 24; from 24 back to 0.
5. Count by 8's from 2 to 34; from 34 back to 2.
6. Count by 8's from 3 to 43; from 43 back to 3.
7. Count by 8's from 5 to 45; from 45 back to 5.
8. Count by 8's from 4 to 52; from 52 back to 4.

FOR THE SLATE OR BOARD.

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)	(*8.*)	(*9.*)	(*10.*)
8	8	8	8	8	8	8	8	8	7
8	8	8	8	8	8	8	8	8	2
8	8	8	8	8	8	8	8	8	8
8	8	8	8	8	8	8	8	3	4
8	8	8	8	8	8	8	8	6	8
8	8	8	8	8	8	8	8	8	5
8	1	2	3	4	5	6	7	5	6
From 15	12	16	11	19	14	20	13	17	
Take 8	5	7	6	8	5	8	7	6	

Lesson XXI.

9 and 1 are 10	9 from 9 leaves 0	9 − 8 + 7 = ?
9 " 2 " 11	9 " 10 " 1	9 + 9 − 8 = ?
9 " 3 " 12	9 " 11 " 2	14 − 9 + 6 = ?
9 " 4 " 13	9 " 12 " 3	10 + 9 − 7 = ?
9 " 5 " 14	9 " 13 " 4	9 + 8 − 6 = ?
9 " 6 " 15	9 " 14 " 5	18 − 9 + 8 = ?
9 " 7 " 16	9 " 15 " 6	16 − 9 − 5 = ?
9 " 8 " 17	9 " 16 " 7	9 + 9 + 7 = ?
9 " 9 " 18	9 " 17 " 8	15 − 9 + 6 = ?
9 " 10 " 19	9 " 18 " 9	11 + 9 − 8 = ?
9 " 11 " 20	9 " 19 " 10	9 + 12 + 4 = ?
9 " 12 " 21	9 " 20 " 11	19 − 9 + 7 = ?

For the Slate or Dictation.

$4+9=?$	$12+9=?$	$12-9=?$	$17-9=?$
$7+9=?$	$9+2=?$	$14-9=?$	$19-9=?$
$9+6=?$	$8+9=?$	$18-9=?$	$16-9=?$
$9+10=?$	$9+9=?$	$10-9=?$	$15-9=?$

For the Slate or Board.

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.)	(10.)
9	9	9	9	9	9	9	9	9	9
9	9	9	9	9	9	9	9	9	8
9	9	9	9	9	9	9	9	9	7
9	9	9	9	9	9	9	9	9	9
9	9	9	9	9	9	9	9	9	6
9	1	2	3	4	5	6	7	8	9
From 16	19	21	14	20	15	18	17	13	
Take 7	6	8	9	7	9	5	8	9	

Lesson XXII.

10 and 1 are 11	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
10 " 2 " 12	10	10	10	10	10	10	10	10
10 " 3 " 13	10	10	10	10	10	10	10	10
10 " 4 " 14	10	10	10	10	10	10	10	10
10 " 5 " 15	10	10	10	10	10	10	10	6
10 " 6 " 16	10	10	10	10	10	10	10	10
10 " 7 " 17	10	10	10	10	10	10	10	10
10 " 8 " 18	10	10	10	10	10	10	10	9
10 " 9 " 19	10	10	10	10	10	10	10	10
10 " 10 " 20	10	10	10	10	10	10	10	10
10 " 11 " 21	10	10	10	10	10	10	10	7
10 " 12 " 22	10	2	3	4	5	7	9	8

For the Slate or Dictation.

Copy and write the proper numbers in the place of (?):

8+6=?	15−7=?	12+?=19	7+3−5=?
9−?=4	?−5=10	12−?=8	14−8+?=10
7+?=14	11+?=20	?+9=17	6+9−?=5
?+10=18	?+4=17	?−6=5	?+12−6=9

Addition.

4	7	?	11	6	?	?	3	4	?	5
9	?	12	8	?	9	8	?	9	12	?
?	14	15	?	18	17	20	16	?	20	11

Subtraction.

10	15	?	16	?	14	?	17	19	?	13
?	?	4	9	8	?	3	?	9	7	?
3	9	8	?	5	6	12	9	?	11	4

Oral Exercises.

1. If a book costs 12 cents and a ball costs 7 cents, what do both cost? What is the difference in their cost?

2. A lady having $19 in her purse, spent $9 for a shawl; how much had she left?

3. Henry walked 9 miles one day, 7 miles the next, and 5 miles the next. How far did he walk in the 3 days?

4. Anna had 18 pinks, and gave Gracie 9. How many had she left?

5. If there are 7 boys and 12 girls in a class, how many pupils in the class? How many more girls than boys?

6. In the park 5 boys are flying kites, 8 are playing ball, and 4 are rolling hoops. How many boys in all?

7. In a basket containing 15 oranges, 6 were decayed. How many were sound?

8. Jennie picked 13 quarts of berries, and sold 5 quarts of them; how many quarts remained unsold?

9. If the sum of two numbers is 16, and the less number is 6, what is the greater? If the less number is 9?

10. If the minuend is 17 and the subtrahend is 8, what is the remainder?

11. If the subtrahend is 8 and the remainder is 9, what is the minuend?

12. From the sum of 8 and 6 take 5. To the difference between 12 and 7 add 9.

13. Take 6 quarts and 4 quarts of chestnuts from 15 quarts, and how many quarts will remain?

Lesson XXIII.

SLATE EXERCISES.

Copy and add:

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)
4326	2170	9081	3721	5060
1672	429	2816	4008	3716
5048	1614	307	590	8007
2910	531	6590	2416	970
372	6075	400	107	88
35	84	1356	50	9

(*6.*) *Men.*	(*7.*) *Miles.*	(*8.*) *Feet.*	(*9.*) *Days.*	(*10.*) *Dollars.*	(*11.*) *Pounds.*
421	272	910	327	415	612
506	164	231	63	6008	136
75	300	506	125	790	524
140	45	352	81	205	205
807	108	60	406	400	362
53	75	27	140	67	31

(12.)	(13.)	(14.)	(15.)	(16.)	(17.)
Days.	*Bricks.*	*Cents.*	*Pecks.*	*Trees.*	*Oranges.*
32	504	3050	812	308	45
140	82	28	6054	270	163
16	130	931	107	45	400
3425	2607	2144	80	706	82
203	1002	306	4205	152	209
2060	300	70	324	66	57

Lesson XXIV.

Copy and subtract:

	(1.)	(2.)	(3.)	(4.)	(5.)
From	94231	76154	31706	60017	52700
Subtract	43421	34625	15314	28326	11046

	(6.)	(7.)	(8.)	(9.)	(10.)
From	43671	63042	84200	17891	30047
Subtract	34250	5214	52628	3506	23527

(11.)	(12.)	(13.)	(14.)	(15.)
806215	326081	753165	246038	600300
74042	254826	34046	237245	50712

(16.)	(17.)	(18.)	(19.)	(20.)
43250 cents.	90800 rods.	13902 acres.	20387 bales.	$8700
20436 "	5073 "	4264 "	925 "	925

(21.)	(22.)	(23.)	(24.)	(25.)
$473004	37064 miles.	81070 men.	32000 feet.	$12000
7521	6208 "	7305 "	4800 "	350

Lesson XXV.

The following table will furnish all the exercises for the slate and board that will be required. Only a part of the time devoted to recitation should be given to this kind of work in connection with the *oral* and other exercises that follow the preceding tables.

TABLE 9.

	A	B	C	D	E	F	G	H	I	J
1.	3	2	4	5	2	5	9	4	8	1
2.	2	6	5	7	1	3	2	8	4	9
3.	1	3	6	6	4	8	7	5	3	8
4.	5	9	7	5	8	6	3	8	7	2
5.	4	8	7	6	6	8	6	9	2	4
6.	7	9	5	9	1	9	8	6	9	3
7.	6	5	2	8	5	7	1	9	7	5
8.	8	4	6	4	6	8	5	7	1	8
9.	7	8	4	7	3	9	7	6	8	9
10.	9	7	8	4	8	6	3	9	6	7
11.	6	5	3	7	4	7	9	6	5	9
12.	8	7	1	8	9	5	8	7	3	4

After the pupil can *count* readily by any one of the nine digits, as taught in the preceding pages, he may be exercised on this table, by rapidly adding each column from bottom to top; then from top to bottom; next, by adding each line from left to right; then from right to left. Then he may start with 1, and add the columns and lines in the same way. Then start with 2, 3, 4, etc., to 9, in succession.

1. Exercises in *Addition* from the table, with numbers of two, three, four, or more figures.

2. First, take the figures opposite **1**, and in columns A and B, and under these place the figures that are opposite **2** and **3** in the same columns, for the first example; next commence with the figures opposite **2**, and under them place the figures that are opposite **3** and **4**, etc., as follows:

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)	(*8.*)
32	26	13	59	48	79	65	84
26	13	59	48	79	65	84	78
13	59	48	79	65	84	78	97

3. Copy, in the same manner, from columns B and C, C and D, D and E, etc.

4. In the same way, copy examples of four, five, or more numbers of *two* figures each.

5. Then copy examples containing numbers of *three* figures each, commencing opposite **1** again, and using columns A B C, thus:

(*9.*)	(*10.*)	(*11.*)	(*12.*)	(*13.*)	(*14.*)	(*15.*)
324	265	136	597	487	795	652
265	136	597	487	795	652	846
136	597	487	795	652	846	784

6. Then use, in the same way, the numbers from columns B C D, D E F, etc.

7. And, in the same manner, copy examples that contain five, six, seven, or more numbers, of *three* figures each.

8. Then copy numbers of *four* figures each, using four columns, as A B C D, B C D E, C D E F, etc.; and, in the same manner, numbers of *five* and *six* figures each, if desired.

Lesson XXVI.

1. Exercises in *Subtraction* from the table (on page 36), with numbers of two, three, four, or more figures.

2. First use numbers of *two* figures each, taken from the column A and B, using the numbers opposite **1** and **2** for the first example, and opposite **2** and **3** for the second example, and so on, placing the *lesser* of the two numbers used for each example under the *greater*. Thus,

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)	(*8.*)	(*9.*)
32	26	59	59	79	79	84	84	97
26	13	13	48	48	65	65	78	78

3. In the same manner, copy examples from the columns B and C, C and D, D and E, etc.

4. The following are examples of numbers with *three* figures each, from columns A B C:

(*10.*)	(*11.*)	(*12.*)	(*13.*)	(*14.*)	(*15.*)	(*16.*)	(*17*).
324	265	597	597	795	795	846	846
265	136	136	487	487	652	652	784

5. Examples with numbers of *four* figures each:

(*18.*)	(*19.*)	(*20.*)	(*21.*)	(*22.*)	(*23.*)	(*24.*)
3245	2657	5975	5975	7959	7959	8464
2657	1366	1366	4876	4876	6528	6528

6. Similar examples from columns B C D E:

(*25.*)	(*26.*)	(*27.*)	(*28.*)	(*29.*)	(*30.*)	(*31.*)
6571	9758	9758	9591	9591	5285	8473
3664	3664	8766	8766	5285	4646	4646

7. In like manner, copy and arrange examples with numbers having *five, six,* or more figures.

MULTIPLICATION.

Lesson XXVII.

1. ***Multiplication***, or multiplying, is the process of taking one of two numbers as many times as there are units in the other. Or,

It is a short process of *adding equal* numbers.

2. The number taken, or multiplied, is called the ***Multiplicand.***

3. The number to multiply by, or that shows *how many times* the multiplicand is to be taken, is called the ***Multiplier.***

4. The number obtained by multiplying one of two numbers by the other is called the ***Product.***

5. The ***Sign of Multiplication*** is ×. It is read *times*, or *multiplied by.*

Thus, 6 cents × 5 = 30 cents is read, 6 cents *multiplied by* 5, or 5 *times* 6 cents *equals* 30 cents, and is equal to

6 cents + 6 cents + 6 cents + 6 cents + 6 cents = 30 cents.

6. The multiplicand and multiplier are called ***Factors*** of the *product.*

Thus, in 7 × 6 = 42, 7 is the *multiplicand*, 6 is the *multiplier*, 42 is the *product*, and 7 and 6 are the *factors* of the product.

Changing the order of the factors does not change the result, since 7 × 6 is the same as 6 × 7, and may be read 6 times 7, or 7 times 6.

TABLES.*

Lesson XXVIII.

2 times 0 are 0	2 times 7 are 14	6 × 2 = ?
2 " 1 " 2	2 " 8 " 16	4 × 2 = ?
2 " 2 " 4	2 " 9 " 18	2 × 9 = ?
2 " 3 " 6	2 " 10 " 20	10 × 2 = ?
2 " 4 " 8	2 " 11 " 22	8 × 2 = ?
2 " 5 " 10	2 " 12 " 24	7 × 2 = ?
2 " 6 " 12		2 × 12 = ?

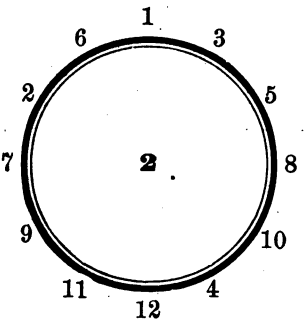
Lesson XXIX.

1. The following illustration is given to show that multiplication is based on addition, and how the product may be obtained by successive additions of the same number. The pupil should be taught to find the product of two numbers by addition, until he sees clearly the relation of the processes.

2+2 =	two 2's, or 2 × 2.
2+2+2 =	three 2's, or 2 × 3.
2+2+2+2 =	four 2's, or 2 × 4.
2+2+2+2+2 =	five 2's, or 2 × 5.
2+2+2+2+2+2 =	six 2's, or 2 × 6.
2+2+2+2+2+2+2 =	seven 2's, or 2 × 7.
2+2+2+2+2+2+2+2 =	eight 2's, or 2 × 8.
2+2+2+2+2+2+2+2+2 =	nine 2's, or 2 × 9.
2+2+2+2+2+2+2+2+2+2 =	ten 2's, or 2 × 10.

* Before commencing these tables, read again the suggestions on page 17.

2. To facilitate the memorizing of *each* table, and for *review,* as well as to give variety to the exercises, the teacher will find this little device very useful. It may be used as follows:



Make a circle on the slate or board, and place the numbers from 1 to 12 in the circumference, without regard to the order of their arrangement.

Place one of the numbers in the centre, for the multiplier, as 2, and, commencing at any number in the margin, as at 1, and going round the circle to the *right,* require the pupil to read, thus: 2 *times* 1 *are* 2, 2 *times* 3 *are* 6, 2 *times* 5 *are* 10, etc.; then, reverse and read to the *left,* thus, 2 *times* 1 *are* 2, 2 *times* 6 *are* 12, 2 *times* 2 *are* 4, etc.

When a table can be repeated in this order with tolerable promptness, then use in succession the figures in the margin for multipliers, and the central figure for the multiplicand, thus: *Once* 2 *is* 2, 3 *times* 2 *are* 6, 5 *times* 2 *are* 10, 8 *times* 2 *are* 16, etc.

The teacher may now point in rapid succession to the numbers in the margin, and the pupil promptly give the *products;* thus, the teacher points to 12, the pupil instantly gives the product 24; to 10, he responds, 20; to 4, he says 8; to 7, he says 14, etc.

Then, by erasing the 2 and inserting any other number, we have a *new table,* to be treated in the same manner; and so on.

A few minutes of each day's recitation spent in exercises of this kind will soon make the pupil familiar with all the tables.

For the Slate or Board.

Multiplication at Sight.

Multiplicand.	2	5	3	6	4	10	7	9	11	8	12
Multiplier.	2	2	2	2	2	2	2	2	2	2	2
Product.	4	10									

Multiply	2	6	2	2	8	9	2	5	2	2
By	4	2	3	7	2	2	10	2	11	12

Oral Exercises.

How many are:

1. 5 rods × 2?	*5.* 2 bushels × 7?	*9.* 12 yards × 2?
2. 4 pecks × 2?	*6.* 10 gallons × 2?	*10.* 2 pints × 9?
3. 2 miles × 6?	*7.* 2 years × 10?	*11.* 2 inches × 8?
4. 9 men × 2?	*8.* 8 quarts × 2?	*12.* 11 weeks × 2?

13. At $6 a barrel, what will 2 barrels of flour cost?

14. How many dollars are $6 + $6? 2 times $6? $6 taken 2 times?

15. What will 2 oranges cost, at 3 cents each?

16. If 1 bag holds 2 bushels, how many bushels in 4 bags?

17. At $2 each, what is the cost of 6 chairs? Of 8 chairs?

18. If you ride 9 miles an hour, how far will you ride in 2 hours?

19. What is the cost of 2 pairs of boots, at $5 a pair?

For the Slate and Dictation.

Copy and write the proper *number* in the place of (?):

$7 \times 2 + 4 = ?$	$2 \times 9 - 3 = ?$	$2 \times 6 + 6 = ?$
$6 \times 2 + 8 = ?$	$2 \times 8 + 4 = ?$	$9 \times 2 - 7 = ?$
$10 \times 2 - 5 = ?$	$11 \times 2 - 6 = ?$	$12 \times 2 + 6 = ?$
$2 \times 5 + 10 = ?$	$2 \times 9 + 5 = ?$	$2 \times 11 - 8 = ?$

Lesson XXX.

3 times 0 are 0	4 times 0 are 0	3 × 4 = ?
3 " 1 " 3	4 " 1 " 4	4 × 5 = ?
3 " 2 " 6	4 " 2 " 8	6 × 3 = ?
3 " 3 " 9	4 " 3 " 12	7 × 4 = ?
3 " 4 " 12	4 " 4 " 16	3 × 8 = ?
3 " 5 " 15	4 " 5 " 20	4 × 7 = ?
3 " 6 " 18	4 " 6 " 24	10 × 4 = ?
3 " 7 " 21	4 " 7 " 28	9 × 3 = ?
3 " 8 " 24	4 " 8 " 32	3 × 7 = ?
3 " 9 " 27	4 " 9 " 36	10 × 3 = ?
3 " 10 " 30	4 " 10 " 40	4 × 9 = ?
3 " 11 " 33	4 " 11 " 44	12 × 3 = ?
3 " 12 " 36	4 " 12 " 48	4 × 11 = ?

For the Slate or Board.

6	4	2	5	10	0	3	9	7	11	8	12
3	3	3	3	3	3	3	3	3	3	3	3
5	3	6	2	8	10	7	4	11	9	0	12
4	4	4	4	4	4	4	4	4	4	4	4
4	4	0	5	10	2	4	3	12	4	11	4
6	5	3	4	2	0	3	4	2	4	3	0

Dictation Exercises.

1. 12 are how many 2's? how many 3's? how many 4's?

2. 24 are how many 2's? how many 3's? how many 4's?

3. 18 are how many 2's? how many 3's?

4. 16 are how many 2's? how many 4's? 27 are how many 3's?

5. 3 times 8=4 times ?	*9.* 6×2=4×?	*13.* 4×5=2×?
6. 4 times 9=3 times ?	*10.* 9×2=3×?	*14.* 2×8=4×?
7. 2 times 12=4 times ?	*11.* 4×4=2×?	*15.* 2×10=4×?
8. 3 times 6=2 times ?	*12.* 4×6=2×?	*16.* 3×12=4×?

For the Slate or Board.

1. How many are 3 times 532?

By Addition.

532
532
532
1596 Sum.

By Multiplication.

Multiplicand. 532
Multiplier. 3
Product. 1596

	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
Multiply	4231	5123	6120	8312	7432
By	2	3	4	3	2

(*7.*)	(*8.*)	(*9.*)	(*10.*)	(*11.*)
20122	63421	82103	12201	73023
4	2	3	4	3

(*12.*)	(*13.*)	(*14.*)	(*15.*)	(*16.*)
42102	84213	51302	21320	61202
4	2	3	3	4

(*17.*)	(*18.*)	(*19.*)	(*20.*)	(*21.*)
90321	42102	73210	10443	83000
3	4	3	2	3

(*22.*)	(*23.*)	(*24.*)	(*25.*)	(*26.*)
34210	43023	52102	33223	42002
2	3	4	3	4

Lesson XXXI.

5	times	0	are	0	6	times	0	are	0	6	×	7	+	2 = ?
5	"	1	"	5	6	"	1	"	6	5	×	8	+	5 = ?
5	"	2	"	10	6	"	2	"	12	4	×	9	−	6 = ?
5	"	3	"	15	6	"	3	"	18	10	×	6	+	3 = ?
5	"	4	"	20	6	"	4	"	24	3	×	11	−	3 = ?
5	"	5	"	25	6	"	5	"	30	6	×	6	+	4 = ?
5	"	6	"	30	6	"	6	"	36	5	×	7	+	10 = ?
5	"	7	"	35	6	"	7	"	42	8	×	4	−	2 = ?
5	"	8	"	40	6	"	8	"	48	9	×	3	+	3 = ?
5	"	9	"	45	6	"	9	"	54	4	×	5	+	8 = ?
5	"	10	"	50	6	"	10	"	60	12	×	3	−	6 = ?
5	"	11	"	55	6	"	11	"	66	7	×	7	−	9 = ?
5	"	12	"	60	6	"	12	"	72	6	×	9	+	6 = ?

Which is greater, three 3's or four 2's? Three 6's or four 5's? Five 5's or six 4's? Six 7's or five 8's? Four 9's or five 7's?

Multiplication at Sight.

4	8	6	5	3	9	4	6	4	12	0	8	7	2
5	3	4	6	5	4	6	3	5	3	6	0	5	6

For the Slate and Dictation.

7	?	12	?	?	7	6	?	8	11	?	9
?	6	?	5	6	?	?	10	6	?	12	?
35	42	48	60	54	35	36	50	?	44	72	36

5 × 8 = 10 × ?	8 × 6 = 12 × ?	6 × 6 = 9 × ?
6 × 4 = 3 × ?	4 × 9 = 6 × ?	3 × 12 = 6 × ?
10 × 6 = 5 × ?	0 × 3 = 5 × ?	6 × 8 = 4 × ?

Oral Exercises.

How many are:

1. 10 leaves × 6?	*5.* 7 gallons × 5?	*9.* 12 trees × 4?
2. 5 pages × 8?	*6.* 4 quarts × 10?	*10.* 5 marbles × 9?
3. 6 lines × 7?	*7.* 2 pints × 12?	*11.* 6 posts × 6?
4. 11 words × 4?	*8.* 9 barrels × 6?	*12.* 8 rails × 4?

13. What will 4 kites cost, at 8 cents each? At 10 cents?

14. In 1 week there are 7 days; how many days in 5 weeks? In 6 weeks?

15. At 9 cents a dozen, what will 4 dozen eggs cost? 5 dozen? 6 dozen?

16. What is the cost of 6 tons of coal, at $4 a ton? At $5?

17. Which is greater, 5 times 9 or 6 times 8? 7 × 6 or 8 × 5? 9 × 3 or 4 × 8?

18. A lady paid $8 for a hat, and 6 times as much for a cloak; what did the cloak cost her? What did both cost?

19. What is the cost of 12 tons of coal, at $4 a ton?

20. What is the cost of 9 pencils, at 4 cents each? At 5 cents? At 6 cents?

21. Emma paid 4 cents apiece for 8 oranges, and had 6 cents left; how much money had she at first?

22. How much less than $40 must be paid for 8 yards of cloth, at $4 a yard?

23. If a pound of rice cost 6 cents, what will 9 pounds cost? 11 pounds?

24. If there are 8 panes of glass in one window, how many panes are there in 4 windows?

25. At $6 a barrel, what will be the cost of 6 barrels of flour? Of 8 barrels? Of 10 barrels?

26. If 1 man eat 5 pounds of meat in a week, how much will 9 men eat? 8 men? 12 men?

Lesson XXXII.

FOR THE SLATE OR BOARD.

In which the product of each figure may or may not *exceed* 9. The teacher should here explain the method of "carrying."

	(*1.*)	(*2.*)	(*3.*)	(*4.*)
Multiplicand.	42563	24175	12563	8376
Multiplier.	4	3	5	2
Product.	170252			

(*5.*)	(*6.*)	(*7.*)	(*8.*)	(*9.*)
23054	540175	135042	71502	32145
5	3	6	4	3

(*10.*)	(*11.*)	(*12.*)	(*13.*)	(*14.*)	(*15.*)
86204	90563	17302	2483	4532	2614
5	2	6	3	4	6

Lesson XXXIII.

7	times	0	are	0	8	times	0	are	0	$7 \times 0 + 8 = ?$
7	"	1	"	7	8	"	1	"	8	$6 \times 7 + 4 = ?$
7	"	2	"	14	8	"	2	"	16	$12 \times 5 - 10 = ?$
7	"	3	"	21	8	"	3	"	24	$8 \times 8 - 4 = ?$
7	"	4	"	28	8	"	4	"	32	$6 \times 8 + 2 = ?$
7	"	5	"	35	8	"	5	"	40	$9 \times 5 - 3 = ?$
7	"	6	"	42	8	"	6	"	48	$8 \times 9 + 3 = ?$
7	"	7	"	49	8	"	7	"	56	$10 \times 7 - 8 = ?$
7	"	8	"	56	8	"	8	"	64	$7 \times 7 + 6 = ?$
7	"	9	"	63	8	"	9	"	72	$10 \times 8 + 9 = ?$
7	"	10	"	70	8	"	10	"	80	$7 \times 9 - 3 = ?$
7	"	11	"	77	8	"	11	"	88	$8 \times 5 + 10 = ?$
7	"	12	"	84	8	"	12	"	96	$12 \times 7 - 4 = ?$

Drill in exercises similar to those on pages 38, 39, 43, and 45.

Oral Exercises.

What is the cost of:

1. 7 oranges, at 4 cents each?
2. 9 hats, at $6 each?
3. 6 slates, at 10 cents each?
4. 10 books, at 8 cents each?
5. 8 tops, at 9 cents each?
6. 12 chairs, at $5 each?
7. 9 desks, at $8 each?
8. 7 maps, at $10 each?
9. 11 sheep, at $4 each?
10. 6 globes, at $8 each?

11. Mary gave 10 cents a yard for 8 yards of ribbon. How many cents did she give for the whole?

12. How much greater is 7 times 7 than 4 times 12?

13. How much less is 6 times 7 than 5 times 9?

14. Ella paid 8 cents a skein for 7 skeins of silk, and 10 cents for some buttons; what did she pay for both?

15. George has 9 marbles, and John has 3 times as many; how many has John? How many have both? How many more has John than George?

16. At 12 cents a dozen, what is the cost of 7 dozen of eggs?

17. What is the cost of 8 tons of coal, at $5 a ton?

For the Slate or Board.

(1.)	(2.)	(3.)	(4.)	(5.)
23402	54167	14068	26135	86243
7	5	6	8	4

(6.)	(7.)	(8.)	(9.)	(10.)
43267	75003	372601	524600	26431
3	4	7	8	6

(11.)	(12.)	(13.)	(14.)	(15.)
194006	342150	920146	63241	33724
5	8	4	7	8

Lesson XXXIV.

9	times	0	are	0	10	times	0	are	0	9 × 4 + 4 = ?
9	"	1	"	9	10	"	1	"	10	10 × 9 + 10 = ?
9	"	2	"	18	10	"	2	"	20	9 × 8 − 2 = ?
9	"	3	"	27	10	"	3	"	30	7 × 12 + 6 = ?
9	"	4	"	36	10	"	4	"	40	9 × 9 + 9 = ?
9	"	5	"	45	10	"	5	"	50	7 × 9 + 7 = ?
9	"	6	"	54	10	"	6	"	60	8 × 8 − 6 = ?
9	"	7	"	63	10	"	7	"	70	9 × 5 + 10 = ?
9	"	8	"	72	10	"	8	"	80	10 × 10 − 8 = ?
9	"	9	"	81	10	"	9	"	90	12 × 8 − 6 = ?
9	"	10	"	90	10	"	10	"	100	6 × 9 − 4 = ?
9	"	11	"	99	10	"	11	"	110	9 × 12 + 7 = ?
9	"	12	"	108	10	"	12	"	120	10 × 11 + 5 = ?

Lesson XXXV.

11	times	0	are	0	12	times	0	are	0	5 × 11 + 10 = ?
11	"	1	"	11	12	"	1	"	12	12 × 7 + 6 = ?
11	"	2	"	22	12	"	2	"	24	9 × 11 − 9 = ?
11	"	3	"	33	12	"	3	"	36	10 × 8 − 7 = ?
11	"	4	"	44	12	"	4	"	48	11 × 10 + 6 = ?
11	"	5	"	55	12	"	5	"	60	9 × 11 + 8 = ?
11	"	6	"	66	12	"	6	"	72	12 × 10 − 10 = ?
11	"	7	"	77	12	"	7	"	84	0 × 10 + 12 = ?
11	"	8	"	88	12	"	8	"	96	11 × 12 + 8 = ?
11	"	9	"	99	12	"	9	"	108	12 × 0 + 9 = ?
11	"	10	"	110	12	"	10	"	120	11 × 11 − 6 = ?
11	"	11	"	121	12	"	11	"	132	9 × 12 − 8 = ?
11	"	12	"	132	12	"	12	"	144	12 × 8 + 10 = ?

Drill the pupil in *oral*, *slate*, and dictation exercises, as before.

Lesson XXXVI.

Oral Exercises.

1. Harry having 12 marbles, gave away 5, and then bought 8 more; how many marbles had he then?

2. At $11 each, what is the cost of 10 coats? Of 9 coats?

3. What is the difference between 9 times 8 and 6 times 12? Between 11 times 8 and 9 times 10?

4. At 7 cents a quart, what is the cost of 5 quarts of milk? Of 8 quarts? Of 10 quarts? Of 12 quarts?

5. James sold his knife for 14 cents, which was 5 cents more than it cost; what did it cost?

6. At 12 cents a pound, what is the cost of 6 pounds of beef? Of 7 pounds? Of 8 pounds? Of 12 pounds?

7. If a boy earns $5 a week, how many dollars can he earn in 6 weeks? In 8 weeks? In 11 weeks?

8. A boy has 9 apples and 5 times as many peaches; how many peaches has he? How many of both?

9. Jay has 10 cents, and Asa has 9 times as many; how many have both? How many more has Asa than Jay?

10. At $8 a barrel, what is the cost of 9 barrels of flour?

Let the pupil, *at sight*, or upon *hearing* a number read, name all its sets of *two factors*, which multiplied together will produce the number. Thus, 24.

Ans. 2 times 12; 3 times 8; 4 times 6.

Name the sets of *two* factors in the following:

6	21	36	56	72	90
8	28	45	60	77	96
12	27	48	63	80	100
16	30	49	64	81	108
18	35	50	66	84	110

Lesson XXXVII.

FOR THE SLATE OR BOARD.

	(1.)	(2.)	(3.)	(4.)	(5.)
Multiply	3724	5063	2134	7350	3205
By	6	8	12	9	11

(6.)	(7.)	(8.)	(9.)	(10.)
24050	13241	34042	63100	40625
7	12	11	9	8

(11.)	(12.)	(13.)	(14.)	(15.)
52160	34625	73106	16342	62830
12	8	7	11	9

(16.)	(17.)	(18.)	(19.)	(20.)
30426	56030	25618	80046	97342
7	9	11	6	5

(21.)	(22.)	(23.)	(24.)	(25.)
73400	61072	17030	45006	42819
12	8	7	11	4

(26.)	(27.)	(28.)	(29.)	(30.)
90300	18081	30764	21405	42637
9	7	5	12	11

31. Multiply 24305 by 5; by 6; by 8; by 9; by 12.
32. Multiply 42013 by 7; by 8; by 12; by 11; by 6.
33. Multiply 15426 by 9; by 7; by 8; by 12; by 11.
34. Multiply 60320 by 12; by 6; by 11; by 9; by 7.

Lesson XXXVIII.

To multiply by two or more figures:*

1. Multiply 2648 by 35.

	2648	Multiplicand.	2648
	35	Multiplier.	35
2648 × 5 =	13240	1st Partial Product.	13240
2648 × 3 =	7944	2d Partial Product.	7944
2648 × 35 =	92680	Total Product.	92680

	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
Multiply	475	863	739	6942	7326
By	24	34	18	25	36

Find the *product* of

7. 2342 × 27.	*12.* 3405 × 45.	*17.* 28105 × 56.
8. 3624 × 38.	*13.* 7362 × 39.	*18.* 62430 × 64.
9. 4065 × 16.	*14.* 5378 × 42.	*19.* 47156 × 75.
10. 1672 × 33.	*15.* 1967 × 53.	*20.* 73815 × 63.
11. 6307 × 48.	*16.* 5342 × 54.	*21.* 14806 × 84.

22. Multiply 384 by 10; by 100; by 1000; by 10000.
23. Multiply 476 by 20; by 300; by 1500; by 6000.
24. Multiply 3642 by 40; by 250; by 600; by 2400.
25. Multiply 5307 by 120; by 80; by 8000; by 900.
26. Multiply 4200 by 10; by 50; by 700; by 1200.

* The pupil has already been taught how to multiply by numbers not greater than 12. The teacher should here give such additional explanations as are necessary to make the pupil thoroughly understand the process of multiplying by two or more figures; also, how to multiply by 10, 100, 1000, etc., and when there are ciphers on the right of *the multiplier.*

Lesson XXXIX.

The following table will furnish all the additional exercises in Multiplication, for the *slate* and *board*, that will be required:

TABLE.

	A	B	C	D	E	F	G	H	I	J
1.	3	6	4	6	9	4	6	9	4	8
2.	2	4	8	7	3	5	5	3	5	6
3.	4	2	3	6	5	2	9	4	2	7
4.	1	9	6	3	7	6	8	2	6	5
5.	5	6	8	4	4	7	3	6	7	3
6.	6	7	2	8	6	5	6	8	3	4
7.	7	2	4	9	2	3	7	9	2	6
8.	4	5	5	5	3	2	9	3	5	7
9.	2	9	3	7	8	4	2	5	8	3
10.	8	3	6	2	7	5	4	6	3	2
11.	3	4	7	8	1	9	5	4	6	5
12.	5	2	8	4	5	6	3	7	4	8

1. Exercises in *Multiplication* from the table, in which the multiplier may contain one, two, three, or more figures.

2. First, copy the figures opposite **1**, for the multiplicand, using numbers with two, three, four, or more figures, as may be required, from the columns A B C D, etc., and for the multiplier use the figure or figures directly under the ***right-hand*** figure or figures of the multiplicand. Thus,

3. When the multiplicand contains *three* figures and the multiplier *one* figure.

(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)
364	248	423	196	568	672	724
8	3	6	8	2	4	5

4. In the same manner, copy examples from columns B C D, C D E, D E F, E F G, etc.

5. When the multiplicand contains *four* figures:

(8.)	(9.)	(10.)	(11.)	(12.)	(13.)
3646	2487	4236	1963	5684	6728
7	6	3	4	8	9

6. When the multiplicand contains *four* figures and the multiplier *two* figures. Copy multiplicands as before, and for the multipliers use the two figures directly under the *two right-hand* figures of the multiplicands. Thus,

(14.)	(15.)	(16.)	(17.)	(18.)	(19.)
3646	2487	4236	1963	5684	6728
87	36	63	84	28	49

7. In like manner, copy examples from columns B C D E, C D E F, D E F G, etc.

8. When the multiplicand contains *five* figures, and the multiplier *three* figures. Let us begin opposite **1**, and copy from column B C D E F. Thus,

(20.)	(21.)	(22.)	(23.)	(24.)
64694	48735	23652	96376	68447
635	652	376	447	865

DIVISION

LESSON XL.

1. ***Division,*** or dividing, is the process of finding *how many times* one of two numbers is contained in the other. Or,

It is the process of finding *one* of the *equal parts* of a number.

2. The number to be divided is called the ***Dividend;*** the number by which the dividend is divided is called the ***Divisor;*** and the result obtained by dividing the dividend is called the ***Quotient.***

3. When a part of the dividend is left after the division is performed, it is called the ***Remainder,*** and must always be *less* than the *divisor.*

4. The ***Sign of Division*** is ÷. It is read *divided by,* and shows that the number *before* it is to be divided by the number *after* it.

Thus, 24÷6 = 4 is read, 24 *divided by* 6 *equals* 4. Or, we may say, 6 *is contained in* 24, 4 *times.* 24 is the *dividend,* 6 is the *divisor,* and 4 is the *quotient.*

5. The object of division is *two-fold:*

1st. *To find how many times one number is contained in another.*

EXAMPLE. A boy having 8 cents, bought oranges at 4 cents apiece; how many oranges did he buy?

In this example, the object is to find *how many times* 4 cents is contained in 8 cents; 4 cents is *contained in* 8 cents 2 times. Hence, he could buy 2 oranges for 8 cents. 8÷4 = 2.

2d. *To divide a number into equal parts.*

EXAMPLE. A boy paid 8 cents for 2 oranges; what did he pay for each?

In this example, the object is to divide 8 cents into *two equal parts;* 8 cents ÷ 2 = *one half* of 8 cents, which is 4 cents. Hence, he paid 4 cents apiece. 8÷2 = 4.

The actual *process* in both examples is the same, but the *reasoning* is somewhat different. In the first, the dividend and divisor are *like* numbers, and the *quotient* is *times;* in the second, the divisor and dividend are *unlike* numbers, and the quotient is of the same name as the dividend.

Lesson XLI.

When a number or a thing is divided into *two equal parts, one* of the parts is called ***One half;*** thus,

One of *two equal parts* of an apple is called *one half* of an apple.

One half is written 1 over 2; thus, $\frac{1}{2}$. $\frac{1}{2}$ of 8 is 8 ÷ 2; read 8 *divided by* 2, or 2 is *contained in* 8, or simply 2 *in* 8; and with the answer is written 8 ÷ 2 = 4, and may be read, *two in eight, four times.*

When a number or a thing is divided into *three equal parts, one* of the parts is called ***One third;*** thus,

One of the *three equal parts* of an apple is called *one third* of an apple.

One third is written 1 over 3; thus, $\frac{1}{3}$. $\frac{1}{3}$ of 9 is 9 ÷ 3; read 9 *divided by* 3, or 3 is *contained in* 9, or simply 3 *in* 9; and with the answer is written 9 ÷ 3 = 3, read, *three in nine, three times.*

When a number or a thing is divided into *four equal parts, one* of the parts is called ***One fourth;*** thus,

One of the *four equal parts* of an apple is called *one fourth* of an apple.

One fourth is written 1 over 4; thus, $\frac{1}{4}$. $\frac{1}{4}$ of 16 is $16 \div 4$; read 16 *divided by* 4, or 4 is *contained in* 16, or 4 *in* 16; and with the answer is written $16 \div 4 = 4$.

What is meant by *one half* of any thing? *One third* of any thing? *One fourth?*

One of *five equal parts* of anything is called *One fifth.*

One fifth is written 1 over 5; thus, $\frac{1}{5}$. $\frac{1}{5}$ of 20 is $20 \div 5 = 4$.

One sixth is written 1 over 6; thus, $\frac{1}{6}$. $\frac{1}{6}$ of 18 is $18 \div 6 = 3$.

One seventh is written 1 over 7; thus, $\frac{1}{7}$. $\frac{1}{7}$ of 28 is $28 \div 7 = 4$.

One eighth is written 1 over 8; thus, $\frac{1}{8}$. $\frac{1}{8}$ of 24 is $24 \div 8 = 8$.

What then is meant by *one fifth* of anything? *One sixth? One seventh? One eighth?*

One ninth is written 1 over 9; thus, $\frac{1}{9}$. $\frac{1}{9}$ of 18 is $18 \div 9 = 2$.

One tenth is written 1 over 10; thus, $\frac{1}{10}$. $\frac{1}{10}$ of 50 is $50 \div 10 = 5$.

One eleventh is written 1 over 11; thus, $\frac{1}{11}$. $\frac{1}{11}$ of 44 is $44 \div 11 = 4$.

One twelfth is written 1 over 12; thus, $\frac{1}{12}$. $\frac{1}{12}$ of 36 is $36 \div 12 = 3$.

What then is meant by *one ninth* of anything? *One tenth? One eleventh? One twelfth?*

TABLES.*

LESSON XLII.

2 in	2,	Once.		3 in	3,	Once.		$6 \div 2 = ?$
2 "	4,	2	times.	3 "	6,	2	times.	$9 \div 3 = ?$
2 "	6,	3	"	3 "	9,	3	"	$12 \div 3 = ?$
2 "	8,	4	"	3 "	12,	4	"	$10 \div 2 = ?$
2 "	10,	5	"	3 "	15,	5	"	$14 \div 2 = ?$
2 "	12,	6	"	3 "	18,	6	"	$21 \div 3 = ?$
2 "	14,	7	"	3 "	21,	7	"	$30 \div 3 = ?$
2 "	16,	8	"	3 "	24,	8	"	$22 \div 2 = ?$
2 "	18,	9	"	3 "	27,	9	"	$27 \div 3 = ?$
2 "	20,	10	"	3 "	30,	10	"	$24 \div 2 = ?$
2 "	22,	11	"	3 "	33,	11	"	$18 \div 3 = ?$
2 "	24,	12	"	3 "	36,	12	"	$36 \div 3 = ?$

Division at Sight.

Divisor. Dividend.

2) 10 8 12 6 14 4 20 16 22 18 24

Quotient. 5

3) 24 9 12 21 18 30 15 21 23 27 36

FOR THE SLATE OR DICTATION.

$22 \div 2 = ?$	$33 \div 3 = ?$	$16 \div 2 = ?$	$15 \div 3 = ?$	$14 \div 2 = ?$
$24 \div 3 = ?$	$18 \div 2 = ?$	$18 \div 3 = ?$	$20 \div 2 = ?$	$27 \div 3 = ?$
$16 \div 2 = ?$	$21 \div 3 = ?$	$24 \div 2 = ?$	$30 \div 3 = ?$	$36 \div 3 = ?$
$18 \div ? = 9$	$24 \div ? = 8$	$36 \div ? = 12$	$? \div 2 = 7$	$? \div 3 = 9$

* Repeat the tables in the *direct* and *inverse* order, also by *equal parts;* thus, *one-half* of 8 is 2; *one-third* of 15 is 5; etc. See page 17.

ORAL EXERCISES.

How many

2's in 12?	2's in 16?	3's in 27?	2's in 24?
3's in 15?	2's in 20?	2's in 22?	3's in 30?
3's in 33?	3's in 21?	3's in 18?	3's in 24?

How many are

1. 24 rods ÷ 3?	*4.* 27 feet ÷ 3?	*7.* 16 acres ÷ 2?
2. 18 miles ÷ 2?	*5.* 20 pounds ÷ 2?	*8.* 36 years ÷ 3?
3. 12 quarts ÷ 3?	*6.* 30 years ÷ 3?	*9.* 22 inches ÷ 2?

How many are

10. ½ of 8 men?	*13.* ⅓ of 30 minutes?	*16.* ½ of 16 gallons?
11. ⅓ of 15 boys?	*14.* ½ of 18 bushels?	*17.* ⅓ of 27 pounds?
12. ¼ of 24 hours?	*15.* ⅓ of 21 years?	*18.* ½ of 14 yards?

19. How many lemons, at 3 cents each, can be bought for 15 cents?

Ans. As many lemons as 3 cents is contained times in 15 cents, which is 5 times. Therefore, 5 lemons can be bought for 15 cents.*

20. If 2 melons cost 16 cents, what is the cost of 1 melon?

Ans. The cost of 1 melon is *one half* (½) of 16 cents, or 8 cents.

21. How do you find one of 3 equal parts, or 1 *third* of a number?

22. How do you find one of 2 equal parts, or 1 *half* of a number?

23. If 2 yards of ribbon cost 16 cents, what is the cost of 1 yard?

24. At $3 a yard, how many yards of silk can be bought for $24? For $21? For $27? For $15?

25. If 3 hats cost $18, what does 1 hat cost?

26. When oranges are 3 cents each, how many can you buy for 30 cents?

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* The teacher should make plain the two forms of division, and require the proper solution for each example.

Lesson XLIII.

4 in 4,	Once.		5 in 5,	Once.		16 ÷ 4 = ?
4 " 8,	2	times.	5 " 10,	2	times.	25 ÷ 5 = ?
4 " 12,	3	"	5 " 15,	3	"	15 ÷ 3 = ?
4 " 16,	4	"	5 " 20,	4	"	28 ÷ 4 = ?
4 " 20,	5	"	5 " 25,	5	"	30 ÷ 5 = ?
4 " 24,	6	"	5 " 30,	6	"	32 ÷ 4 = ?
4 " 28,	7	"	5 " 35,	7	"	36 ÷ 3 = ?
4 " 32,	8	"	5 " 40,	8	"	45 ÷ 5 = ?
4 " 36,	9	"	5 " 45,	9	"	36 ÷ 4 = ?
4 " 40,	10	"	5 " 50,	10	"	40 ÷ 5 = ?
4 " 44,	11	"	5 " 55,	11	"	44 ÷ 4 = ?
4 " 48,	12	"	5 " 60,	12	"	60 ÷ 5 = ?

Also, exercise the pupil on each table as follows:

4 in 1, 0 times and 1 over.	4 in 5, once and 1 over.
4 in 2, 0 times and 2 over.	4 in 6, once and 2 over.
4 in 3, 0 times and 3 over.	4 in 7, once and 3 over.
4 in 4, once and 0 over.	4 in 8, 2 times and 0 over.

And so on to 4 in 48, 12 times and 0 over.

Division at Sight.

4) 16 24 12 40 8 28 32 44 20 40 48

5) 25 15 20 30 10 40 35 50 45 60 55

For the Slate or Dictation.

40÷4=?	45÷5=?	36÷4=?	35÷5=?	44÷4=?
24÷4=?	20÷5=?	48÷4=?	55÷5=?	32÷4=?
¼ of 28=?	⅕ of 50=?	¼ of 36=?	⅕ of 60=?	¼ of 44=?
¼ of 32=?	⅕ of 35=?	¼ of 48=?	⅕ of 45=?	¼ of 40=?

ORAL EXERCISES.

How many

4's in 20 ?	5's in 25 ?	4's in 36 ?	5's in 35 ?	4's in 48 ?
5's in 30 ?	4's in 40 ?	5's in 45 ?	4's in 32 ?	5's in 60 ?
4's in 44 ?	5's in 50 ?	4's in 48 ?	5's in 55 ?	4's in 40 ?

How many are

$\frac{1}{4}$ of 12 rods ?	$\frac{1}{4}$ of 36 dollars ?	$\frac{1}{4}$ of 40 days ?
$\frac{1}{5}$ of 30 cents ?	$\frac{1}{5}$ of 40 bushels ?	$\frac{1}{4}$ of 44 trees ?
$\frac{1}{4}$ of 32 men ?	$\frac{1}{4}$ of 48 pounds ?	$\frac{1}{5}$ of 60 acres ?

1. How do you find one of 4 equal parts, or 1 *fourth* of a number ?

2. How do you find one of 5 equal parts, or 1 *fifth* of a number ?

3. How many oranges can be bought for 20 cents, at 4 cents each ? At 5 cents ?

4. At $4 a barrel, how many barrels of apples can be bought for $24 ? For $32 ? For $40 ?

5. If 5 slates cost 45 cents, what is the cost of 1 slate ?

6. Paid 60 cents for 5 yards of muslin ; what was that a yard ?

7. How many times can 4 bushels be taken from 36 bushels ? How many times 4 bushels in 36 bushels ?

8. How many times can $5 be taken from $25 ? From $55 ?

9. Paid 25 cents for 5 oranges ; what did 1 orange cost ?

10. At 4 cents each, how many cakes can you buy for 32 cents ? For 40 cents ? For 48 cents ?

11. If 40 cents are paid for 5 yards of ribbon, what is the cost of 1 yard ?

12. If 48 cents are paid for 4 slates, how much is paid for each slate ?

13. How many boxes will be required to hold 60 pounds of tea, if each box holds 5 pounds ?

Lesson XLIV.

FOR THE SLATE AND BOARD.

When the divisor is 12 or less than 12?

1. Divide 472 by 3.

1st PROCESS.			2d PROCESS.		PROOF.	
Divisor.	Dividend.	Quotient.	Divisor.	Dividend.	157	Quotient.
3	472	157⅓	3	472	3	Divisor.
	3		Quotient.	157, 1	471	
	17				1	Remainder.
	15				472	Dividend.
	22					
	21					
	1	Remainder.				

The *first process* is called ***Long Division***, in which *all* the work is written; the *second process* is called ***Short Division***, in which only the *Quotient* is written, every other step in the operation being carried on in the mind.

All examples should be worked by *Short Division*, when the divisor does not exceed 12.

The teacher should further explain the process, and show how Multiplication and Division prove each other.

(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)
3) 648	3) 402	4) 862	5) 1230	3) 736
216	134	215, 2	246	245, 1

Copy, divide, and prove:

7. 13470 by 2; by 3; by 4.
8. 72051 by 2; by 3; by 4.
9. 60327 by 3; by 4; by 5.
10. 32004 by 3; by 5; by 4.
11. 815620 by 4; by 3; by 5.
12. 140375 by 2; by 5; by 3.

For additional exercises, see Lesson LIII, and pages 53 and 54.

Lesson XLV.

6 in 6, Once.	7 in 7, Once.	$18 \div 6 + 3 = ?$
6 " 12, 2 times.	7 " 14, 2 times.	$21 \div 7 + 6 = ?$
6 " 18, 3 "	7 " 21, 3 "	$42 \div 6 - 5 = ?$
6 " 24, 4 "	7 " 28, 4 "	$54 \div 6 + 1 = ?$
6 " 30, 5 "	7 " 35, 5 "	$63 \div 7 - 3 = ?$
6 " 36, 6 "	7 " 42, 6 "	$48 \div 6 + 4 = ?$
6 " 42, 7 "	7 " 49, 7 "	$49 \div 7 + 8 = ?$
6 " 48, 8 "	7 " 56, 8 "	$72 \div 6 - 9 = ?$
6 " 54, 9 "	7 " 63, 9 "	$56 \div 7 - 8 = ?$
6 " 60, 10 "	7 " 70, 10 "	$84 \div 7 + 3 = ?$
6 " 66, 11 "	7 " 77, 11 "	$66 \div 6 - 6 = ?$
6 " 72, 12 "	7 " 84, 12 "	$60 \div 5 + 8 = ?$

Division at Sight.

6) 18 30 54 12 48 24 60 72 42 66 36

7) 28 35 14 21 70 42 77 49 84 56 63

$42 \div 6 = ?$ $49 \div 7 = ?$ $48 \div 6 = ?$ $56 \div 7 = ?$ $84 \div 7 = ?$
$36 \div 6 = ?$ $77 \div 7 = ?$ $72 \div 6 = ?$ $63 \div 7 = ?$ $54 \div 6 = ?$

Oral Exercises.

How many

1. 6's in 60? 7's in 49? 6's in 66? 7's in 63?
2. 7's in 70? 6's in 36? 7's in 84? 6's in 72?

How many are

3. $\frac{1}{6}$ of 48 books? *6.* $\frac{1}{6}$ of 30 posts? *9.* $\frac{1}{7}$ of 84 barrels?
4. $\frac{1}{7}$ of 49 pens? *7.* $\frac{1}{7}$ of 56 boards? *10.* $\frac{1}{6}$ of 42 boxes?
5. $\frac{1}{7}$ of 63 pins? *8.* $\frac{1}{6}$ of 60 logs? 11. $\frac{1}{7}$ of 70 casks?

12. How do you find one of 7 equal parts, or 1 *seventh* of a number?

13. How do you find one of 6 equal parts, or 1 *sixth* of a number?

14. In one week there are 7 days; how many weeks in 42 days? In 56 days? In 35 days? In 63 days?

15. If a man walk 60 miles in 6 days, how many miles does he walk each day?

16. Paid $56 for 7 barrels of flour; what was that a barrel?

17. How many times can 6 pounds be taken from 42 pounds?

18. How many times can 7 gallons be taken from 77 gallons?

19. How many times $6 in $42? In $54? In $60?

Lesson XLVI.

FOR THE SLATE AND BOARD.

Copy, divide, and prove:

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)
6)75246	7)15476	6)20532	7)86025	6)34100
(*6.*)	(*7.*)	(*8.*)	(*9.*)	(*10.*)
7)90325	6)81530	6)44312	7)82057	6)67315
(*11.*)	(*12.*)	(*13.*)	(*14.*)	(*15.*)
5)63719	6)30812	4)11804	7)80163	6)71300

16. Divide 34106 by 3; by 4; by 5; by 6; by 7.

17. Divide 563014 by 4; by 5; by 7; by 6; by 3.

18. Divide 128305 by 2; by 4; by 7; by 5; by 6.

19. Divide 420068 by 3; by 7; by 5; by 7; by 4.

Lesson XLVII.

8 in 8, Once.	9 in 9, Once.	$56 \div 8 + 3 = ?$
8 " 16, 2 times.	9 " 18, 2 times.	$72 \div 9 + 6 = ?$
8 " 24, 3 "	9 " 27, 3 "	$36 \div 9 + 8 = ?$
8 " 32, 4 "	9 " 36, 4 "	$64 \div 8 - 5 = ?$
8 " 40, 5 "	9 " 45, 5 "	$72 \div 8 - 8 = ?$
8 " 48, 6 "	9 " 54, 6 "	$56 \div 8 + 7 = ?$
8 " 56, 7 "	9 " 63, 7 "	$63 \div 7 + 9 = ?$
8 " 64, 8 "	9 " 72, 8 "	$81 \div 9 - 5 = ?$
8 " 72, 9 "	9 " 81, 9 "	$96 \div 8 + 3 = ?$
8 " 80, 10 "	9 " 90, 10 "	$54 \div 6 - 9 = ?$
8 " 88, 11 "	9 " 99, 11 "	$90 \div 9 + 10 = ?$
8 " 96, 12 "	9 "108, 12 "	$88 \div 8 - 6 = ?$

Division at Sight.

8)40	64	56	24	32	80	48	96	72	88
9)72	27	45	81	54	90	63	99	36	108

$72 \div 8 = ?$	$81 \div 9 = ?$	$56 \div 8 = ?$	$36 \div 9 = ?$
$27 \div 9 = ?$	$48 \div 8 = ?$	$63 \div 9 = ?$	$96 \div 8 = ?$

Copy and write the correct number in the place of (?):

Quotients:	8	?	?	10	?	12	8	9	?
Divisors:	?	9	8	?	9	7	?	?	8
Dividends:	56	72	64	90	81	?	96	99	72

Oral Exercises.

What is

1. $\frac{1}{8}$ of 24? $\frac{1}{8}$ of 72? $\frac{1}{8}$ of 56? $\frac{1}{8}$ of 54? $\frac{1}{8}$ of 72?

2. $\frac{1}{8}$ of 45? $\frac{1}{8}$ of 80? $\frac{1}{8}$ of 64? $\frac{1}{8}$ of 96? $\frac{1}{8}$ of 108?

How many

3. 9's in 27? 8's in 48? 9's in 54? 8's in 56?

4. 8's in 32? 8's in 96? 9's in 72? 9's in 81?

5. How do you find one of 8 equal parts, or 1 *eighth* of a number?

6. How do you find one of 9 equal parts, or 1 *ninth* of a number?

7. How many barrels of flour, at $8 a barrel, can be bought for $48? For $64? For $80? For $56?

8. If 9 books cost 72 cents, what is the cost of 1 book?

9. At 9 cents a yard, how many yards of calico can be bought for 90 cents? For 81 cents? For 108 cents?

10. If 8 tons of coal cost $40, what is the cost of 1 ton?

11. How many times can $8 be taken from $80?

Lesson XLVIII.

FOR THE SLATE OR BOARD.

Copy, divide, and prove:

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)
8)92344	9)17262	8)26357	9)42080	8)31762

Find	What is
6. 1 *sixth* of 73214.	*10.* $\frac{1}{8}$ of 43640 bushels?
7. 1 *seventh* of 340620.	*11.* $\frac{1}{6}$ of 530124 pounds?
8. 1 *eighth* of 503218.	*12.* $\frac{1}{5}$ of 317065 feet?
9. 1 *ninth* of 276590.	*13.* $\frac{1}{4}$ of $601342?

14. Divide $3142520 by 4; by 5; by 8; by 7; by 9.

15. Divide 1632485 feet by 7; by 8; by 6; by 9; by 5.

Lesson XLIX.

10 in 10, Once.	11 in 11, Once.	12 in 12, Once.
10 " 20, 2 times.	11 " 22, 2 times.	12 " 24, 2 times.
10 " 30, 3 "	11 " 33, 3 "	12 " 36, 3 "
10 " 40, 4 "	11 " 44, 4 "	12 " 48, 4 "
10 " 50, 5 "	11 " 55, 5 "	12 " 60, 5 "
10 " 60, 6 "	11 " 66, 6 "	12 " 72, 6 "
10 " 70, 7 "	11 " 77, 7 "	12 " 84, 7 "
10 " 80, 8 "	11 " 88, 8 "	12 " 96, 8 "
10 " 90, 9 "	11 " 99, 9 "	12 "108, 9 "
10 "100, 10 "	11 "110, 10 "	12 "120, 10 "
10 "110, 11 "	11 "121, 11 "	12 "132, 11 "
10 "120, 12 "	11 "132, 12 "	12 "144, 12 "

Division at Sight.

10) 80	60	40	70	50	90	120	100	110
11) 33	55	77	66	44	99	110	88	121
12) 60	48	72	120	36	108	96	132	84

For the Slate or Dictation.

$110 \div 10 = ?$ $108 \div 12 = ?$ $121 \div 11 = ?$ $144 \div 12 = ?$
$84 \div 12 = ?$ $99 \div 11 = ?$ $96 \div 12 = ?$ $110 \div 10 = ?$
$77 \div 11 = ?$ $120 \div 10 = ?$ $108 \div 9 = ?$ $132 \div 11 = ?$

$\frac{1}{10}$ of $100 = ?$ $\frac{1}{11}$ of $99 = ?$ $\frac{1}{10}$ of $120 = ?$ $\frac{1}{12}$ of $132 = ?$
$\frac{1}{12}$ of $84 = ?$ $\frac{1}{12}$ of $108 = ?$ $\frac{1}{11}$ of $110 = ?$ $\frac{1}{11}$ of $88 = ?$

$96 \div 12 + 10 = ?$ $121 \div 11 - 6 = ?$ $84 \div 12 + 12 = ?$
$110 \div 10 + 5 = ?$ $144 \div 12 - 7 = ?$ $77 \div 11 + 20 = ?$

Lesson L.

Oral Exercises.

How many:

1. 10's in 70? 12's in 96? 11's in 88? 12's in 120?

2. 11's in 66? 10's in 110? 12's in 108? 11's in 121?

3. 12's in 60? 12's in 72? 10's in 120? 12's in 132?

4. What is $\frac{1}{3}$ of 3 times 12? $\frac{1}{4}$ of 4 times 10? $\frac{1}{5}$ of 8×5?

5. How many times is 12 contained in 8 times 9? In 6 times 8?

6. Divide 48 by $\frac{1}{3}$ of 24; by $\frac{1}{3}$ of 54; by $\frac{1}{12}$ of 72.

7. How many times is 3×4 contained in 60? In 84?

8. At 12 cents a pound, how many pounds of sugar can be bought for 60 cents? For 96 cents? For 120 cents?

9. If 100 marbles are divided equally among 10 boys, how many marbles will each receive? If 120 marbles are so divided, how many will each receive??

10. If \$48 is paid for 12 tons of coal, what is the cost of 1 ton? What is the cost of 3 tons? Of 5 tons? Of 8 tons?

11. If a man earn \$66 in 11 days, what does he earn in 1 day? How much in 4 days? In 7 days? In 10 days?

12. How many cents are 9 times $\frac{1}{12}$ of 60 cents? 7 times $\frac{1}{9}$ of 81 cents? 8 times $\frac{1}{11}$ of 88 cents? 12 times $\frac{1}{10}$ of 120 cents?

13. From the sum of 16 and 10 subtract 5, and divide the remainder by 7.

14. From 9 times 12 subtract 8, and divide the remainder by 10, and multiply the quotient by 6.

15. How many are 7 times $\frac{1}{10}$ of 80? 10 times $\frac{1}{9}$ of 63? 6 times $\frac{1}{11}$ of 99? 11 times $\frac{1}{12}$ of 120?

16. If 6 cords of wood are worth \$36, what is 1 cord worth? What are 9 cords worth? 12 cords?

Lesson LI.

FOR THE SLATE OR DICTATION.

1. $84 \div 12, \times 10 = ?$
2. $8 \times 9, \div 12 = ?$
3. $120 \div 10, \times 9 = ?$
4. $132 \div 12, \times 5 = ?$
5. $12 \times 6, \div 9 = ?$
6. $110 \div 10, \times 7 = ?$
7. $9 \times 8, +8, \div 10, \times 12, +4, -10, \div 9, +5 = ?$

Each operation is separated by a comma. The pupil may be required to read, thus: 72, 80, 8, 96, 100, 90, 10, 15. Or, the teacher may dictate each operation, and the pupil promptly give each result.

8. $120 \div 10, +8, \div 4, \times 12, +6, \div 11, \times 9, -4 = ?$
9. $72 + 8 + 4, \div 7, -5, \times 9, +7, \div 10, \times 3, +9 = ?$
10. $60 - 20, +8, \div 6, \times 9, \div 8, \times 4, +8, \div 11, \times 12 = ?$
11. $4 \times 3 \times 7, +6, \div 9, \times 10, +8, \div 12, \times 5, -5, \div 5 = ?$

Lesson LII.

FOR THE SLATE OR BOARD.

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)
10) 34670	10) 12734	10) 80631	10) 47350	10) 25060
(*6.*)	(*7.*)	(*8.*)	(*9.*)	(*10.*)
11) 45363	11) 18205	11) 24562	11) 84065	11) 54623
(*11.*)	(*12.*)	(*13.*)	(*14.*)	
12) 387602	12) 163428	12) 493624	12) 806246	

15. How many times 12 gallons in 1462 gallons?
16. How many times \$11 in \$34560? In \$68304?

Find
17. 1 *ninth* of 37216.
18. 1 *twelfth* of 40538.
19. 1 *eleventh* of 61532.

What is
20. $\frac{1}{4}$ of 93476 acres?
21. $\frac{1}{11}$ of 857591 rods?
22. $\frac{1}{8}$ of 34672 pounds?

Lesson LIII.

FOR THE TEACHER. The pupil, as early as possible, should learn by practice to divide any number from 13 to 100 by any number less than 13, *at sight*. The following methods will facilitate the accomplishment of this end, and afford a pleasant exercise.

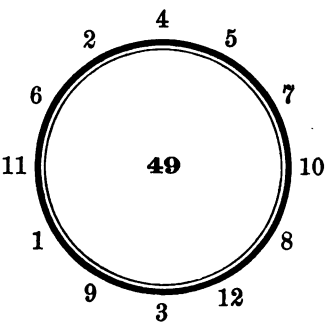
After explaining the following *form of expressing division*, and the manner of reading the *remainders*, either in *fractional* form, or, as so many "*over*," require the pupil to prepare his work on his slate, or on the board, thus: To divide 49 by numbers less than 13:

$\frac{49}{4}=?$ $\frac{49}{5}=?$ $\frac{49}{7}=?$ $\frac{49}{6}=?$ $\frac{49}{10}=?$ $\frac{49}{8}=?$ $\frac{49}{12}=?$

The answers must not be written, but the work *read*, thus: 49 is 12 times 4 and 1 over; 9 times 5 and 4 over; 7 times 7; 8 times 6 and 1 over, etc.

In like manner, the pupil should be exercised on all numbers from 13 to 100.

Another, and perhaps a better method, since there will be less writing required, is in the use of the same device used to learn the multiplication tables.



Draw a circle on the slate or on the board, and on the circumference write the numbers from 2 to 12 inclusive, as divisors, and without regard to order in their arrangement.

Then write any number *greater* than 12 and *less* than 100 in the centre (as 49), for a dividend. Commencing with any divisor, as 4, read to the *right* round the circle, thus: 4 in 49, 12 times and 1 over; 5 in 49, 9 times and 4 over; 7 in 49, 7 times; 10 in 49, 4 times and 9 over, etc. Or, thus: 49 is 12 times 4 and $\frac{1}{4}$ of 4; 9 times 5 and $\frac{4}{5}$ of 5; 7 times 7; 4 times 10 and $\frac{9}{10}$ of 10; etc.

In the same manner, commence and read to the *left*.

Then erase the *central* number, and insert another for a new dividend, which will give a new set of quotients, etc.

A few minutes of each daily recitation devoted to this exercise will in a short time make the pupil familiar with all the tables, and able to multiply or divide, without difficulty or hesitation, by any number not greater than 12.

Lesson LIV.

When the divisor is greater than 12:*

1. Divide 4240 by 16; also, 2878 by 23.

Divisor.	Dividend.	Quotient.
16)	4240 (	265
	32	
	104	
	96	
	80	
	80	

Divisor.	Dividend.	Quotient.
23)	2878 (	$125\frac{3}{23}$
	23	
	57	
	46	
	118	
	115	
	3	Remainder.

* The pupil has already been taught to divide when the divisor is not greater than 12. The teacher should here explain thoroughly the process of dividing when the divisor is greater than 12; also, when the divisor is 10, 100, 1000, etc., or contains ciphers at the right hand.

If the *product* of the divisor by the quotient figure is *greater* than the part of the dividend divided, the quotient figure is *too great* and must be *diminished.* If the *remainder* after any subtraction is *greater* than the divisor, the quotient figure is *too small,* and must be *increased.*

2. Divide 10948 by 36.

		PROOF.	
36) 10948 (304$\frac{4}{36}$		304	Quotient.
108		36	Divisor.
148		1824	
144		912	
4	Rem.	10944	
		4	Remainder.
		10948	Dividend.

Find the *result,* and prove:

3. 2176÷18.	*5.* 4375÷19.	*7.* 5384÷25.	*9.* 2978÷27.
4. 4072÷16.	*6.* 6437÷28.	*8.* 8432÷41.	*10.* 7189÷34.

11. Divide 56304 by 29; by 37; by 46; by 52; by 21.
12. Divide 3142 by 10; by 100; by 1000.
13. Divide 4253 by 20; by 200; by 2000.
14. Divide 6341 by 120; by 230; by 1400.

Lesson LV.

The Table on page 53 will furnish all the exercises for slate and blackboard required.

When the divisor contains but a single figure. First, copy the dividend, commencing with the second line opposite **2**, and using numbers containing three, four, five, or more figures, as may be desired, from columns A B C D, etc., and for the divisor use the figure, or figures, first above *the right-hand figure* of the dividend.

When the dividend consists of *three* figures, copy from the columns A B C; thus,

(*1.*)	(*2.*)	(*3.*)	(*4.*)	(*5.*)	(*6.*)	(*7.*)
4) 248	8) 423	3) 196	6) 568	8) 672	2) 724	4) 455

In the same manner copy from B C D, C D E, D E F.

When the dividend contains *four* figures, copy from A B C D; thus,

(*8.*)	(*9.*)	(*10.*)	(*11.*)	(*12.*)
6) 2487	7) 4236	6) 1963	3) 5684	4) 6728

In like manner use columns B C D E, C D E F, D E F G, etc.

In the the same way copy dividends of *five, six,* or more figures.

When the dividend contains *four* figures, and the divisor *two* figures, copy from columns A B C D as before, and for a divisor use the *two* figures just above the two *right-hand* figures of the dividend; thus,

(*13.*)	(*14.*)	(*15.*)	(*16.*)	(*17.*)
47) 2487 (	87) 4236 (	36) 1963 (	63) 5684 (	84) 6728 (

In the same manner copy from columns B C D E, C D E F, etc. From B C D E, thus,

(*18.*)	(*19.*)	(*20.*)	(*21.*)
79) 4873 (	73) 2365 (	65) 9637 (	37) 6844 (

When the dividend contains *five* figures and the divisor *three,* copy as follows:

(*22.*)	(*23.*)	(*24.*)	(*25.*)
479) 24873 (	873) 42365 (	365) 19637 (	637) 56844 (

In this way, all the exercises required for practice may be taken from this table.

Lesson LVI.

Oral Exercises.

1. How do you find *one* of the *equal parts* of a number or thing? *Ans.* By Division.

2. What is $\frac{1}{2}$ of 18? *Ans.* $18 \div 2$, or 9. $\frac{1}{3}$ of 18? *Ans.* $18 \div 3$, or 6.

3. What is $\frac{1}{3}$ of 24? Of 15? Of 21? Of 30? Of 27? Of 36? Of 33?

4. What is $\frac{1}{4}$ of 24? Of 16? Of 28? Of 20? Of 32? Of 36? Of 48?

5. What is $\frac{1}{5}$ of 20? Of 30? Of 25? Of 40? Of 35? Of 50? Of 55?

6. What is $\frac{1}{6}$ of 24? Of 36? Of 42? Of 54? Of 48? Of 66? Of 72?

7. What is $\frac{1}{7}$ of 21? Of 35? Of 28? Of 42? Of 56? Of 63? Of 77? Of 84?

8. What is $\frac{1}{8}$ of 40? Of 24? Of 56? Of 72? Of 64? Of 80? Of 48? Of 88?

9. What is $\frac{1}{9}$ of 45? Of 54? Of 63? Of 81? Of 90? Of 108? Of 99? Of 72?

10. What is $\frac{1}{12}$ of 36? Of 72? Of 48? Of 60? Of 96? Of 144? Of 84? Of 120?

11. What is meant by 3 fourths ($\frac{3}{4}$) of any number or thing?

Ans. Three of the *four equal parts* into which the number or thing is divided; as, 3 times 1 fourth is equal to 3 fourths.

12. What is $\frac{3}{4}$ of 12? *Ans.* 1 fourth of 12 is $12 \div 4$, or 3, and 3 fourths of 12 is 3 times 3, or 9. Hence, $\frac{3}{4}$ of 12 is 9.

13. What is $\frac{2}{3}$ of 20? $\frac{3}{5}$ of 15? $\frac{4}{5}$ of 30? $\frac{2}{3}$ of 27? $\frac{5}{6}$ of 36? $\frac{3}{8}$ of 40?

14. What is $\frac{2}{3}$ of 18? $\frac{5}{6}$ of 30? $\frac{4}{5}$ of 30? $\frac{3}{5}$ of 40? $\frac{3}{7}$ of 21? $\frac{3}{8}$ of 24?

15. What is $\frac{5}{7}$ of 14? $\frac{3}{8}$ of 24? $\frac{4}{7}$ of 28? $\frac{5}{8}$ of 40? $\frac{5}{6}$ of 42? $\frac{2}{3}$ of 27?

16. What is $\frac{2}{9}$ of 36? $\frac{7}{8}$ of 32? $\frac{4}{5}$ of 45? $\frac{5}{7}$ of 42? $\frac{5}{9}$ of 63? $\frac{4}{5}$ of 60?

17. What is $\frac{3}{10}$ of 50? $\frac{7}{10}$ of 100? $\frac{3}{11}$ of 44? $\frac{5}{12}$ of 60? $\frac{7}{11}$ of 66?

18. What part of 3 is 1? Of 3 is 2?

Ans. Since 1 is 1 third of 3, 2 is 2 times $\frac{1}{3}$, or 2 thirds of 3, written $\frac{2}{3}$.

19. What part of 4 is 1? Of 4 is 3? Of 5 is 1? Of 5 is 3? Of 5 is 4?

20. What part of 8 is 1? Is 3? Is 5? Is 7? Is 4?

21. What part of $4 is $1? Is $3? Of $6 is $1? Is $5?

22. What part of 8 pounds is 1 pound? Is 3 pounds? Is 5 pounds? Is 7 pounds?

23. What part of 7 miles is 1 mile? Is 4 miles? Is 6 miles? Is 5 miles?

24. 4 is what part of 5? Of 7? Of 9? Of 8? Of 10?

25. 3 is what part of 4? Of 5? Of 7? Of 10? Of 12? Of 9? Of 8?

26. $5 is what part of $6? Of $9? Of $12? Of $7? Of $14? Of $8? Of $11?

Lesson LVII.

1. If a ton of hay costs $20, what is the cost of $\frac{1}{4}$ of a ton? Of $\frac{3}{4}$ of a ton? Of $\frac{1}{5}$? Of $\frac{4}{5}$?

2. If a hogshead of sugar is worth $48, what is $\frac{1}{8}$ of it worth? What is $\frac{5}{8}$ worth? What is $\frac{1}{4}$ of it worth? $\frac{3}{4}$? $\frac{1}{8}$? $\frac{3}{8}$? $\frac{5}{8}$? $\frac{7}{8}$?

3. If a clerk earns $12 a week and spends $\frac{2}{3}$ of it, how many dollars does he spend? How many has he left?

4. What is the difference between $\frac{3}{4}$ of 40 and $\frac{4}{5}$ of 25?

5. What is the difference between $\frac{5}{6}$ of 27 and $\frac{3}{7}$ of 35?

6. If $\frac{1}{4}$ of a bushel of pears costs 12 cents, what will $\frac{3}{4}$ of a bushel cost? What will 1 bushel cost?

7. If $\frac{1}{8}$ of a pound of coffee costs 9 cents, what will $\frac{5}{8}$ of a pound cost? What will 1 pound cost?

8. If $\frac{1}{6}$ of a barrel of flour costs $2, what will $\frac{5}{6}$ of a barrel cost? What will 1 barrel cost?

9. James had 30 cents and gave $\frac{2}{3}$ of them for a book; what was the cost of the book? How many cents had he left?

10. If a piece of cloth is worth $24, what is $\frac{3}{8}$ of it worth? $\frac{3}{4}$ of it? $\frac{5}{8}$ of it? $\frac{5}{6}$ of it? $\frac{2}{3}$ of it?

11. What is $\frac{5}{6}$ of 30 bushels of corn? $\frac{5}{6}$ of 36 pounds of sugar?

12. A farmer had 48 cords of wood and sold $\frac{5}{8}$ of it; how many cords did he sell? How many had he left?

13. A lady paid $40 for a shawl, and $\frac{3}{5}$ as much for a bonnet; what did she pay for the bonnet?

14. At 40 cents a pound, what will $\frac{1}{4}$ of a pound of candy cost? $\frac{3}{4}$ of a pound? $\frac{1}{5}$ of a pound? $\frac{3}{5}$? $\frac{5}{8}$? $\frac{3}{10}$? $\frac{2}{5}$?

15. What is the cost of $\frac{5}{8}$ of a yard of ribbon at 24 cents a yard? At 30 cents? At 27 cents? At 36 cents?

16. Jane having 24 plums gave $\frac{1}{3}$ of them to her brother, and $\frac{1}{4}$ of them to her sister. How many plums did she give to her brother and to her sister? How many had she left?

17. George is 25 years old, and his sister Grace is $\frac{4}{5}$ as old. What is her age?

18. At 60 cents a yard, what will $\frac{1}{4}$ of a yard of ribbon cost? $\frac{1}{3}$ of a yard? $\frac{1}{5}$ of a yard? $\frac{4}{5}$ of a yard? $\frac{2}{3}$ of a y

19. George paid 72 cents for a book, and $\frac{5}{8}$ as m knife; what did he pay fo knife, and how he left?

Lesson LVIII.

1. How do you find how many *fourths* there are in a whole number? *Ans.* Multiply the whole number by 4.

2. How do you find how many *thirds* there are in any number? How many *fifths*? How many *sixths*? How many *sevenths*? How many *eighths*? etc.

3. How many *halves* of a peach are there in 1 peach? In 2 peaches? In 3 peaches? In 5?

4. How many *thirds* of a yard in 1 yard? In 3 yards? In 5 yards? In 7 yards?

5. How many *fourths* of an apple in 1 apple? In 3 apples? In 5 apples?

6. How many *fifths* of a dollar in $1? In $2? In $4?

7. How many *thirds* in 4 and 2 thirds, written $4\frac{2}{3}$?

8. How many *fourths* in 3 and 1 fourth, written $3\frac{1}{4}$?

9. How many *sixths* in $2\frac{1}{6}$? In $4\frac{5}{6}$? In $7\frac{3}{6}$? In $8\frac{3}{6}$?

10. How many *eighths* of a yard in $2\frac{1}{8}$ yards?

11. How many *tenths* in $4\frac{3}{10}$? In $6\frac{7}{10}$? In $5\frac{9}{10}$?

12. How many *ones* are there in 8 *halves*, written $\frac{8}{2}$?

Ans. Since there are 2 halves in 1, in 8 halves, there are as many 1's as 2 halves are contained times in 8 halves, or 4 times. Hence, $\frac{8}{2}$ is equal to $8 \div 2$, or 4.

13. How many *ones* in 9 thirds? In 15 thirds? In 12 fourths? In 16 fourths? In 20 fourths?

14. How many 1's in $\frac{15}{2}$? *Ans.* $7\frac{1}{2}$. In $\frac{15}{4}$? *Ans.* $3\frac{3}{4}$.

15. How many 1's in $\frac{14}{6}$? In $\frac{30}{7}$? In $\frac{36}{8}$? In $\frac{45}{9}$? In $\frac{63}{10}$?

16. How many pounds in $\frac{1}{3}$ of a pound? In $\frac{11}{4}$ of a pound? In $\frac{26}{8}$ of a pound? In $\frac{13}{6}$ of a pound?

17. If 4 oranges cost 16 cents, what part of 16 cents does 1 orange cost? What part of 16 cents does 3 oranges cost?

18. At $7 a ton, what part of a ton of coal can be bought for $1? For $2? For $4? For $5? For $6?

Lesson LIX.

1. At $\frac{1}{4}$ of a dollar a yard, what will 3 yards of ribbon cost?

Ans. Since 1 yard costs $\frac{1}{4}$ of a dollar, 3 yards will cost 3 times $\frac{1}{4}$ of a dollar, or $\frac{3}{4}$ of a dollar, equal to $2\frac{1}{4}$ dollars.

2. At $\frac{1}{8}$ of a dollar a pound, what will 4 pounds of tea cost? 6 pounds? 7 pounds? 9 pounds? 10 pounds?

3. What will be the cost of 6 boxes of grapes, at $\frac{1}{4}$ of a dollar a box? At $\frac{1}{3}$ of a dollar a box? At $\frac{1}{2}$ of a dollar?

4. If 1 pound of coffee costs $\frac{1}{8}$ of a dollar, what will 3 pounds cost? 5 pounds? 7 pounds? 10 pounds?

5. How many 1's are 4 times $\frac{1}{5}$? 6 times $\frac{1}{5}$? 5 times $\frac{1}{4}$?

6. How many 1's are 7 times $\frac{1}{8}$? 9 times $\frac{1}{7}$? 8 times $\frac{1}{7}$?

7. If a ton of iron costs $28, what will $\frac{1}{7}$ of a ton cost? What will $\frac{2}{7}$ of a ton cost? $\frac{3}{4}$ of a ton?

8. If 3 pounds of sugar are worth $\frac{1}{8}$ of a dollar, what is 1 pound worth? What are 5 pounds worth? 7 pounds?

9. If a man walks $\frac{1}{5}$ of 10 miles in 1 hour, how far will he walk in 3 hours? In 5 hours? In 7 hours? In 10 hours?

10. At $15 a ton, what will $\frac{1}{3}$ a ton of hay cost? $\frac{1}{5}$ of a ton? $\frac{1}{6}$ of a ton? $\frac{2}{3}$ of a ton?

11. At $6 a yard, what will $2\frac{1}{2}$ yards of cloth cost? $3\frac{1}{3}$ yards? $4\frac{1}{6}$ yards? $5\frac{2}{3}$ yards?

12. What will $\frac{1}{3}$ of 9 pounds of beef cost, at 12 cents a pound? $\frac{3}{4}$ of 12 pounds, at 10 cents?

13. What will $\frac{3}{8}$ of 24 yards of muslin cost, at 10 cents a yard? $\frac{1}{5}$ of 15 yards?

14. At $3\frac{1}{2}$ a week, how much will a boy earn in 2 weeks? In 3 weeks? In 4 weeks? In 6 weeks?

15. If a man drive 12 miles an hour, how far will he drive in $2\frac{1}{2}$ hours? In $3\frac{1}{3}$ hours? In $4\frac{1}{6}$ hours?

16. At $4\frac{1}{2}$ cents each, what will be the cost of 5 oranges?

UNITED STATES MONEY.

Lesson LX.

United States Money is the legal money of the United States.

TABLE.

10 Mills (*m.*)	make	1 Cent .... *ct.*			1000 *m.*
10 Cents	"	1 Dime .... *d.*	$1	=	100 *cts.*
10 Dimes	"	1 Dollar .... $.			10 *d.*

100	Cents	=	1	Dollar	25	Cents	=	$\frac{1}{4}$	Dollar.
75	"	=	$\frac{3}{4}$	"	20	"	=	$\frac{1}{5}$	"
50	"	=	$\frac{1}{2}$	"	$12\frac{1}{2}$	"	=	$\frac{1}{8}$	"

The money of the Dominion of Canada is the same as that of the United States.

ORAL EXERCISES.

1. How many mills in 1 ct.? In 5 cts.? In 7 cts.?

2. How many cents in 1 dime? In 4 d.? In 6 d.?

3. How many dimes in 1 dollar? In $3? In $5?

4. How many cents in 20 mills? In 40 m.? In 50 m.?

5. How many dimes in 30 cts.? In 50 cts.? In 70 cts.?

6. How many dollars in 40 dimes? In 60 d.? In 30 d.?

7. How many dollars in 500 cts.? In 800 cts.?

8. In 400 cents how many dollars? *Half*-dollars? *Quarter*-dollars?

9. In 50 cents how many dimes? In 90 cents?

10. What will 4 yards of ribbon cost, at 2 dimes a yard? How many cents?

11. What is the cost of 8 baskets of peaches, at half a dollar a basket?

Lesson LXI.

1. Dollars are written as whole numbers, with the *Sign* $ placed before the number.

Thus, 6 dollars is written $6; 125 dollars is written $125.

2. When *dollars* and *cents* are written together, a point or dot (.) is placed between them.

Thus, 6 dollars 25 cents is written $6.25; 15 dollars 75 cents is written $15.75.

3. When *cents* only, or *cents* and *mills* are expressed, the dot (.) is placed between the sign $ and the number.

Thus, 45 cents is written $.45; 36 cents 8 mills is written $.368.

4. When the number of cents is less than 10, a cipher must be placed between the dot and the number.

Thus, 8 cents is written $.08; 9 cents 6 mills is written $.096.

5. Mills are always written on the right of cents. $\frac{1}{2}$ cent may be written as 5 mills.

Thus, 12$\frac{1}{2}$ cents may be written $.12$\frac{1}{2}$, or $.125; 87$\frac{1}{2}$ cents may be written $.875.

6. The *sign* $ and the *point* (.) should never be omitted.

For the Slate and Board.

Copy and read the following:

1. $4.75.	*4.* $25.075.	*7.* $.755.	*10.* 450.12\frac{1}{2}$.
2. $10.50.	*5.* $16.09.	*8.* $.087.	*11.* $108.05.
3. $12.25.	*6.* $24.008.	*9.* $1.10.	*12.* 50.62\frac{1}{2}$.

Express in figures:

13. Seventy-five dollars.	*15.* Nine cents six mills.
14. One dollar ten cents.	*16.* Ninety-six cents two mills.

17. One hundred twenty-eight dollars.
18. Two hundred eight dollars.
19. Five hundred sixty-three dollars twenty-five cents.
20. Eighty-five cents five mills.
21. One hundred fifteen dollars sixty-five cents.
22. Eighty-seven dollars eight cents five mills.
23. Twelve hundred fifty dollars eighty-seven and a half cents.
24. Thirty-six dollars thirty-seven and a half cents.
25. Fifteen hundred dollars fifty-seven cents.
26. Twenty-five hundred sixty dollars forty cents.

Lesson LXII.

In ***Addition*** and ***Subtraction,*** the dollars, cents, and mills should be so placed that the points shall stand in the same column.

FOR THE SLATE AND BOARD.

Copy and *add* the following:

(*1.*)	(*2.*)	(*3.*)	(*4.*)
$7.50	$36.125	$100.10	$1.875
5.75	.764	40.125	.375
24.08	15.09	5.078	4.06
1.10	6.40	.963	13.42

Arrange in columns and *add:*

5. $2.25, $12.08, $.736, $50, $27.12½, and $7.005.
6. $38.37½, $108.80, $116, $9.08, $15.105, and $40.40.
7. $1375.50, 750.375, $304.058, $50.50, and $116.
8. $1400, $520.75, $800, $210.10, $75.87½, and $92.07.

Copy, *subtract*, and *prove* the following:

	(*9.*)	(*10.*)	(*11.*)	(*12.*)
From	$27.57	$64.85	$80.05	$240.70
Subtract	9.35	37.125	30.28	93.08

(*13.*)	(*14.*)	(*15.*)	(*16.*)
$250.875	$1500.00	$703.375	$350.00
106.092	950.75	69.50	73.60

Find the *result* of

17. $317.60 — $240.12.
18. $1000 — $816.50.
19. $1284.04 — $500.
20. $2460.875 — $648.10.
21. $2500 — $1204.80.
22. $1670.60 — $1100.085.
23. $3.40 + $1.08 + $.875 + $5 — $4.50 — $.625 — $1.12½.

24. $100 + $15.10 — $25.065 + $.875 — $10.37½ + $17 — $5.095.

25. A gardener paid $4.50 for a wheelbarrow, $1.50 for a spade, and $.75 for a rake; what did he pay for all?

26. Paid for groceries as follows: $.96 for sugar, $1.08 for coffee, $2.38 for tea, and $.87½ for soap. What was the amount paid?

27. Bought a pair of gloves for $1.25; how much change should I receive for a two-dollar bill?

28. Bought a barrel of apples for $2.25, and a sack of flour for $1.60; how much change should I receive for a five-dollar bill?

29. James has two 5-dollar bills. He paid one dollar eighty cents for a pair of skates, seventy-five cents for a knife, three dollars for a sled, and one dollar six cents for a cap. How much money had he left?

30. A man owed a debt of $500. He paid at one time $100, at another $36.80, at another, $250.50, and at another $25; how much remained unpaid?

31. A lady went shopping with $50 in her purse. She paid $5 for a pair of gaiters, $12.37½ for a bonnet, $1.875 for a pair of gloves, and $20.75 for a dress; what did she pay for all, and how much had she left?

32. A farmer sold a cord of wood for $3.50, a tub of butter for $9.75, a cheese for $5.08, and received in payment a barrel of flour for $8.50 and the remainder in money; how much money did he receive?

33. Sold a farm for $4562, which was $325.50 more than it cost. What did it cost?

34. Bought a horse for $410, which was $35.25 less than I paid for him; what did I pay for him?

35. A grocer bought a barrel of sugar for $23.18, a box of tea for $36, a sack of coffee for $12.75, and a barrel of molasses for $28.87. How much more than $100 did the whole cost him?

36. A man bought two horses; for one he paid $245, and for the other $316.50. He sold them both for $600. How much did he gain?

37. Sold a sewing-machine for $54.50, and received in pay only $36.25; how much was still due me?

Lesson LXIII.

In ***Multiplication***, when the multiplicand contains *cents*, put the point (.) in the product *two* places from the *right;* when *mills, three* places from the *right*, and place the sign $ before the whole.

	(*1.*)	(*2.*)	(*3.*)	(*4.*)
Multiply	$18.75	$23.125	$45.06	$64.054
By	7	8	6	9
Product.	$131.25			

In like manner:

5. Multiply $562 by 8; by 9; by 12; by 14; by 23.

6. Multiply $124.50 by 7; by 6; by 11; by 12.

7. Multiply $95.375 by 5; by 7; by 8; by 24; by 12.

8. Multiply $208.096 by 8; by 6; by 9; by 14; by 32.

Find the *cost:*

9. Of 8 yards of muslin, at 25 cts. a yard; at $.28; at $.32; at 12½ cents.

10. Of 12 baskets of peaches, at $.90 a basket; at $1.08.

11. Of 42 bushels of wheat, at $1.65 a bushel; at $1.875.

12. Of 15 barrels of flour, at $7.40 a barrel; at $8.15.

13. Of 65 yards of silk, at $2.625 a yard; at $3.75.

14. Of 36 tons of coal, at $3.90 a ton; at $4.625.

15. Of 54 pounds of coffee, at 28 cents a pound; at 30 cts.

16. Of 18 days' work, at $2.25 a day; at $2.62½.

17. A grocer sold 26 pounds of tea, at $.65 a pound; 75 pounds of sugar, at 11 cts. a pound; and 8 boxes of soap, at $5.84 a box. What did he receive for the whole?

18. What is the cost of 234 barrels of potatoes, at $1.85 a barrel?

19. A piece of cloth, containing 35 yards, was bought for $3.25 a yard, and sold for $4.50 a yard. What was the gain?

20. Which will cost the most, and how much, 27 barrels of flour, at $8.25 a barrel, or 108 bushels of wheat, at $1.90 a bushel?

21. What is the cost of 75 miles of railroad, at $3274 a mile?

22. A farmer sold 356 bushels of corn, at $.65 a bushel, and paid out of what he received $47.50; how much had he left?

23. Sold 105 barrels of apples, at $2.45 a barrel; what was received for the whole?

24. Find the cost of 75 bushels of wheat, at $1.84 a bushel.

Lesson LXIV.

In ***Division,*** when the dividend contains *cents,* put the point (.) in the quotient *two* places from the *right;* when *mills,* put it *three* places from the *right,* and place the sign $ before the whole.

(1.)	(2.)	(3.)	(4.)
8) $346.08	7) $162.764	6) $284.000	12) 98.40
$43.26	$23.252	$47.333	$8.20

In like manner:

5. Divide $632.48 by 4; by 5; by 6; by 7; by 8.

6. Divide $1247.244 by 6; by 8; by 12; by 9; by 7.

What is:

7. 1 *eighth* of $564.60.

8. 1 *ninth* of $1436.185.

9. 1 *twelfth* of $25000.

10. 1 *seventh* of $176.80.

11. $\frac{1}{16}$ of $841.644.

12. $\frac{1}{18}$ of $3249.60.

13. $\frac{1}{32}$ of $47.98.

14. $\frac{1}{24}$ of $1042.40.

15. If 8 baskets of peaches cost $10.40, what is the cost of 1 basket? Of 2 baskets? Of 5 baskets?

16. Paid $15.75 for 7 days' work. What did I pay a day?

17. If 12 tons of coal cost $55.20, what does 1 ton cost? 3 tons? 5 tons? 7 tons? 10 tons?

18. If 6 barrels of apples cost $19.08, what will 1 barrel cost? 12 barrels? 16 barrels?

19. If 9 yards of ribbon cost $3.375, what is the cost of 1 yard? Of 4 yards? Of 8 yards? Of 12 yards?

20. If a man work 15 days for $26.25, what does he receive per day? How much for 7 days?

21. A man paid $3375 for 27 acres of land. What was the price per acre?

MEASURES.

Lesson LXV.

Dry Measure is used in measuring articles not liquid, as grains, fruits, vegetables, and other articles.

TABLE.

2 Pints (*pt.*)	=	1 Quart, . .	*qt.*	1 *bu.* =	64 *pt.*
8 Quarts	=	1 Peck, . .	*pk.*		32 *qt.*
4 Pecks	=	1 Bushel, . .	*bu.*		4 *pk.*

2 Quarts	make	1 Small Measure.
2150.42 Cubic Inches	"	1 Bushel.
36 Bushels	"	1 Chaldron (for *coke* and *coal*).

The weight of a bushel of certain kinds of grains in many of the States has been fixed by law. The standard adopted is *not uniform*, but the following largely prevails:

Wheat, . . 60 lb.	Beans, ... 60 lb.	Wheat Bran, . . 20 lb.
Rye, . . . 56 "	Buckwheat, . . 42 "	Rye Meal, . . . 56 "
Corn, . . . 56 "	Flax Seed, . . 56 "	Corn Meal, . . . 50 "
Barley, . . 48 "	Hemp Seed, . . 44 "	Corn in Ear, . . 68 "
Oats, . . . 32 "	Potatoes, . . . 60 "	Clover Seed, . . 60 "
Peas, . . . 60 "	Onions, . . . 57 "	Timothy Seed, . . 45 "

1. How many quarts in 1 pk.? How many pints?
2. How many pecks in 2 bu.? In 3 bu. 2 pk.?
3. In 40 quarts how many pecks? How many bushels?
4. In 48 pints how many quarts? Pecks? What part *of a bushel?*

5. At 8 cents a quart, what is the cost of 1 peck of peaches? Of 3 pecks?

6. At 6 cents a pint, what is the cost of 2 quarts of chestnuts? Of 1 peck?

7. How many pecks in 24 qt.? In 36 qt.? Half-pecks in 40 qt.?

8. How many bushels in 20 pk.? In 26 pk.?

9. What cost 1 pk. of clover seed, at $8 a bu.? 3 pecks?

10. Find the cost of 2 bu. 2 pk. of plums, at 25 cts. a peck.

11. At $4 a bushel, what is the cost of 1 pk. of cranberries? Of 3 pk.? Of ½ a bushel? Of 1 bu. 3 pk.? Of 2¼ bushels?

Lesson LXVI.

Liquid Measure is used in measuring all kinds of *liquids*, as oil, molasses, milk, water, etc.

TABLE.

4	Gills (*gi.*)	= 1	Pint, . . .	*pt.*		
2	Pints	= 1	Quart, . . .	*qt.*		
4	Quarts	= 1	Gallon, . .	*gal.*	1 *hhd.* =	2016 *gi.*
31½	Gallons.	= 1	Barrel, . .	*bbl.*		504 *pt.*
63	Gallons	= 1	Hogshead, .	*hhd.*		252 *qt.*
						63 *gal.*
						2 *bbl.*

The barrel is not the same size in every State; it varies from 28 to 32 gallons.

A *liquid gallon* contains 231 cubic inches.

In prescribing and compounding *liquid* medicines the following units are used:

60	Minims (♏)	= 1	Fluidrachm .	*f*ʒ.		
8	Fluidrachms	= 1	Fluidounce .	*f*ʒ.		
16	Fluidounces	= 1	Pint . . .	*O.*	*Cong.* 1 =	♏ 61440.
8	Pints	= 1	Gallon. . . .	*Cong.*		*f*ʒ 1024.
						*f*ʒ 128.
						O.

1. How many gills in 2 pt.? In 2 qt.? In 6 pt.? In 2 qt. 1 pt.?

2. In 2 quarts how many pints? How many gills?

3. How many gallons in 20 qt? *Half*-gallons? Pints?

4. In 2 gal. 2 qt. how many quarts? How many pints?

5. When milk is worth 8 cents a quart, what is a pint worth? What is a gallon worth?

6. How many quarts in 16 pt.? In 17 pt.? In 21 pt.?

7. How many pints in $\frac{1}{2}$ a gallon? In $1\frac{1}{2}$ gal.? In $2\frac{1}{2}$ qt.?

8. If a cup hold 3 pints, how many times can it be filled from a jar holding 2 gal. 1 qt. of water?

9. What is the cost of $1\frac{1}{2}$ gal. of vinegar, at 4 cents a pint?

10. What part of a gallon is 1 qt.? Is 3 qt.? Is 3 pt.? Is 5 pt.? Is 6 pt.?

11. How many pints of water will fill a vessel that holds 2 gal. 3 qt. 1 pt.? That holds $1\frac{1}{4}$ gal.?

12. At 40 cents a gallon, what will 1 pint of oil cost? 3 pints? 2 qt. 1 pt.?

13. At $1.08 a gallon, what will 3 qt. of syrup cost?

Lesson LXVII.

Units of Time are used in measuring a portion of duration.

Table.

60 Seconds (*sec.*)	= 1 Minute, . .	*min.*
60 Minutes	= 1 Hour, . . .	*hr.*
24 Hours	= 1 Day, . . .	*da.*
7 Days	= 1 Week, . . .	*wk.*
365 Days, or 12 Calendar Mo.	= 1 Common Year.	*yr.*
366 Days	= 1 Leap Year, .	*yr.*

Common Year.

1 *yr.* = 525600 *min.*, 8760 *hr.*, 12 *mo.*, 365 *da.*

The names of the months, called calendar months, and the number of days in each are:

1. January (*Jan.*), . . . *31*	7. July, ... *31*
2. February (*Feb.*), . . . *28* or *29*	8. August (*Aug.*), ... *31*
3. March (*Mar.*), . . . *31*	9. September (*Sept.*), . . . *30*
4. April (*Apr.*), ... *30*	10. October (*Oct.*), ... *31*
5. May, ... *31*	11. November (*Nov.*), ... *30*
6. June, ... *30*	12. December (*Dec.*), ... *31*

The number of days in each month is easily remembered by committing the following lines:

Thirty days hath September,
April, June, and November;
All the rest have thirty-one,
Excepting February alone,
To which we twenty-eight assign,
Till leap year gives it twenty-nine.

1. How many days in 3 wk.? In 5 wk.? In 4 wk. 5 da.?
2. How many weeks in 28 da.? In 35 da.? In 63 da.?
3. How many minutes in $\frac{1}{2}$ hr.? In $\frac{1}{4}$ hr.? In $\frac{1}{3}$ hr.?
4. Name the months that have 30 da. each? 31 da. each?
5. What part of an hour is 30 min.? 20 min.? 12 min.?
6. What part of a day is 6 hr.? 8 hr.? 12 hr.? 4 hr.?

Lesson LXVIII.

Avoirdupois Weight is used for all the ordinary purposes of weighing.

Table.

16 Ounces (*oz.*)	= 1 Pound.	*lb.*	8 Ounces = $\frac{1}{2}$ Pound.
100 Pounds	= 1 Hundredweight.	*cwt.*	4 Ounces = $\frac{1}{4}$ Pound.
20 Cwt., or 2000 Pounds	= 1 Ton.	*T.*	7000 Gr. = 1 Pound.
			2240 Lbs. = 1 Long Ton.

The *ounce* is often divided into halves, quarters, etc.

The following denominations are also used :

100	pounds of	Grain or Flour	make	1 Cental.
100	"	Dry Fish	"	1 Quintal.
100	"	Nails	"	1 Cask or Keg.
196	"	Flour	"	1 Barrel.
200	"	Pork or Beef	"	1 Barrel.
280	"	Salt at N. Y. Salt Works	"	1 Barrel.
240	"	Lime	"	1 Cask.

1. How many ounces in 2 lb. ? In 3 lb. ? In 2 lb. 9 oz.?

2. How many are ¼ of 16 oz. ? ½ of 8 oz. ? ⅛ of 16 oz. ?

3. How many ounces in ½ lb. ? In ¼ lb. ? In ⅛ of 2 lb. ?

4. How many pounds in 32 oz. ? In 40 oz. ? In 48 oz. ?

5. In 3 cwt. 40 lb. how many pounds ? In 5 cwt. 60 lb. ?

6. What is the cost of ½ lb. candy, at 3 cents an ounce ?

7. How many cwt. in ¼ of a ton ? How many pounds ?

8. How many cwt. in ½ of a ton ? In ⅛ T. ? In ¾ T. ?

9. How many pounds in ½ cwt. ? In 1½ cwt. ?

10. How many pounds in ½ bbl. of flour ? In ½ keg of nails ? In ½ bbl. of salt ? In ½ cental of grain ?

11. How many barrels in 800 pounds of pork ? Of beef ?

12. What is the cost of a keg of nails, at 3 cents a pound ? Of ½ a keg ? Of 1½ kegs ?

13. What part of 1 cwt. is 50 lb. ? 25 lb. ? 20 lb. ? 75 lb. ?

Lesson LXIX.

Troy Weight is used in weighing gold, silver, and precious stones, and in philosophical experiments.

TABLE.

24 Grains (*gr.*)	=	1 Pennyweight, .	*pwt.*	1 *lb.* = 5760 *gr.*
20 Pennyweights	=	1 Ounce, . . .	*oz.*	1 *lb.* = 240 *pwt.*
12 Ounces	=	1 Pound, . . .	*lb.*	1 *lb.* = 12 *oz.*

Lesson LXX.

Apothecaries' Weight is used by apothecaries and physicians in compounding *dry* medicines.

TABLE.

20 Grains (*gr.* xx)	= 1 Scruple, .	*sc.* or ℈.	℔ 1 =	*gr.*	5760.
3 Scruples (℈iij)	= 1 Dram, . .	*dr.* or ʒ.		℈	288.
8 Drams (ʒ viij)	= 1 Ounce, . .	*oz.* or ℥.		ʒ	96.
12 Ounces (℥ xij)	= 1 Pound, . .	*lb.* or ℔.		℥	12.

Medicines are bought and sold in quantities by Avoirdupois weight. The pound, ounce, and grain are the same in Troy and Apothecaries' Weight.

1. How many grains in 2 pwt.? In 3 pwt.? In 5 pwt.?

2. How many pwt. in 2 oz.? Ounces in 40 pwt.? Pounds in 60 oz.?

3. How many ounces in 2 lb. 5 oz.? In $2\frac{1}{2}$ lb.?

4. How many ounces in 40 pwt.? In 60 pwt.? In 100 pwt.?

5. How many ounces in 32 dr.? In 48 dr.? In 56 dr.?

6. What part of a pound Troy is 6 oz.? 4 oz.? 8 oz.?

7. How many pounds in 60 oz.? In 48 oz.? In 72 oz.? In 144 oz.?

8. How many ounces in $3\frac{1}{4}$ lb.? In $5\frac{1}{2}$ lb.? In 4 lb. 7 oz.?

9. How many tablespoons, each weighing 2 oz., can be made of 2 lb. of silver? Of 3 lb. 8 oz.? Of $2\frac{1}{4}$ lb.?

10. How many ounces in 2 lb. of gold? In 2 lb. of medicine? In 2 lb. of tea?

11. What will be the cost of a gold chain weighing 2 oz., at $1 a pennyweight?

12. How many powders, of 5 grains each, can be made of 1 dram of medicine?

Lesson LXXI.

Linear Measure is used in measuring *lines*, or distances:

TABLES.

Ordinary Distances.

12	Inches (*in.*)	= 1	Foot, . . .	*ft.*	1 *mi.* = 63360 *in.*
3	Feet	= 1	Yard, . . .	*yd.*	1 *mi.* = 5280 *ft.*
5½	Yards, or 16½ ft.	= 1	Rod, . . .	*rd.*	1 *mi.* = 1760 *yd.*
320	Rods	= 1	Mile, . . .	*mi.*	1 *mi.* = 320 *rd.*

Roads and Boundaries.

$7\frac{92}{100}$	Inches	= 1	Link, . . .	*l.*	1 *mi.* = 63360 *in.*
25	Links	= 1	Rod, . . .	*rd.*	1 *mi.* = 8000 *l.*
4	Rods	= 1	Chain, . .	*ch.*	1 *mi.* = 320 *rd.*
80	Chains	= 1	Mile, . . .	*mi.*	1 *mi.* = 80 *ch.*

Cloth Sold by the Yard.

2¼	Inches	= 1	Sixteenth of a Yard, . .	$\frac{1}{16}$ *yd.*
2	Sixteenths (4½ in.)	= 1	Eighth of a Yard, . . .	$\frac{1}{8}$ *yd.*
2	Eighths (9 in.)	= 1	Fourth of a Yard, . . .	$\frac{1}{4}$ *yd.*
2	Quarters (18 in.)	= 1	Half of a Yard, ...	$\frac{1}{2}$ *yd.*
4	Quarters (36 in.)	= 1	Yard, ...	1 *yd.*

Mariners and Geographers.

9	Inches (*in.*)	= 1	Span, ...	*sp.*
8	Spans, or 6 Feet	= 1	Fathom, ...	*fath.*
120	Fathoms	= 1	Cable's Length, ...	*c. l.*
7½	C. Length, or 880 Fath.	= 1	Naut. or Geog. Mile, . .	*mi.*
3	Geographic Miles	= 1	League, ...	*L.*
1	Geographic Mile	= $1\frac{8}{60}$	Statute Miles, ...	*mi.*
60	Geographic Miles, or 69.16 Statute Miles	= 1	Degree, ...	*deg.*
360	Degrees	=	the Circumference of the Earth.	

A *Knot*, used in measuring distances at sea, is equivalent to a *nautical mile.*

Lesson LXXII.

Miscellaneous.

3 Barleycorns	= 1 Inch.	5 Paces	= 1 Rod.
3 Inches	= 1 Palm.	6 Points	= 1 Line.
4 Inches	= 1 Hand.	12 Lines	= 1 Inch.
$3\frac{3}{10}$ Feet	= 1 Pace.	18 Inches	= 1 Eng. Cubit.

1. How many inches in 2 ft.? In 1 yd.? In 6 ft.?

2. How many inches in 1 yd. 1 ft. 10 in.? In 2 yd. 6 in.?

3. How many inches in $\frac{1}{2}$ ft.? In $\frac{1}{3}$ ft.? In $\frac{1}{4}$ ft.?

4. How many feet in 24 in.? In 30 in.? In 48 in.?

5. In 2 yd., how many feet? How many inches?

6. In 2 yd., how many quarters? Eighths? Sixteenths?

7. What part of a foot is 3 in.? 4 in.? 6 in.? 9 in.?

8. What part of a yard is 9 in.? 1 ft.? 18 in.? 2 ft.?

9. At 3 cents a foot, what will 4 yards of wire cost?

10. How many feet in 4 fath.? In 6 fath.? In 8 fath.?

11. How many leagues in 12 mi.? In 18 mi.? In 24 mi.?

12. What is the cost of a cable 12 fath. long, at $1 a ft.?

13. How many chains in 16 rods? In 24 rd.? In 36 rd.?

14. How many ft. high is a pony that measures 12 hands?

15. How many inches in 2 cubits? How many feet?

16. How many paces in 6 rods? Rods in 40 paces?

17. How many quarters in $3\frac{1}{4}$ yd.? In $5\frac{3}{4}$ yd.? In $4\frac{1}{2}$ yd.?

18. At 12 cents a yard, what will $4\frac{1}{2}$ yd. of ribbon cost?

19. If a steamer sail 18 mi. an hour, how many leagues does it sail?

20. If a vessel draw 21 ft. of water, how many fathoms does she draw?

21. What part of a mile is 40 chains? Is 20 chains?

22. How many inches in $\frac{1}{4}$ of a yard? In $\frac{1}{2}$ yd.? In $\frac{1}{8}$ yd.?

23. How many yards in 9 half-yards? In 16 fourths? In 26 eighths? In 32 sixteenths?

Lesson LXXIII.

Surface, or ***Square Measure,*** is used in measuring *surfaces;* as land, boards, plastering, etc.

Tables.

144 Sq. In. (*sq. in.*) = 1 Sq. Foot, *sq. ft.*
9 Square Feet = 1 Sq. Yard, *sq. yd.*
30¼ Square Yards = 1 Sq. Rd. or Perch, *sq. rd.; P.*
160 Square Rods = 1 Acre, . . *A.*

1 *A.* = 6272640 *sq. in.* = 43560 *sq. ft.* = 4840 *sq. yd.* = 160 *sq. rd.; P.*

In computing the ***area*** or ***contents*** of land:

625 Sq. Links (*sq. l.*) = 1 Pole, . . . *P.*
16 Poles = 1 Sq. Chain, . *sq. ch.*
10 Square Chains = 1 Acre, . . . *A.*

1 *A.* = 100000 *sq. l.* = 100 *P.* = 10 *sq. ch.*

To find the area or surface of a square or rectangle, multiply the length by the breadth.

1. How many square inches in a piece of glass 1 in. wide and 10 in. long? In a piece 2 in. wide and 12 in. long?

2. How many square feet in a strip of board 2 ft. wide and 9 ft. long? In a board 3 ft. wide and 12 ft. long?

3. How many square feet in a floor 7 ft. wide and 9 ft. long? In a floor 10 ft. wide and 12 ft. long?

4. How many acres in 40 sq. chains? In 60 sq. ch.?

5. How many square feet in a hall 12 ft. long and 6 ft. wide? How many square yards?

Government Land Measure.

1 Quarter Section = 160 Rods Square = 25600 Sq. Rods = 160 A.
1 Section = 1 Mile Square = 1 Sq. Mile = 640 A.
1 Township = 6 Miles Square = 36 Sq. Miles = 23040 A.

Lesson LXXIV.

Cubic, or Solid Measure is used in measuring timber, wood, stone, etc.

TABLES.

1728 Cubic In. (*cu. in.*)	=	1 Cu. Foot, *cu. ft.*	*cu. yd.*	*cu. ft.*	*cu. in.*
27 Cubic Ft.	=	1 Cu. Yard, *cu. yd.*	1 =	27 =	46656

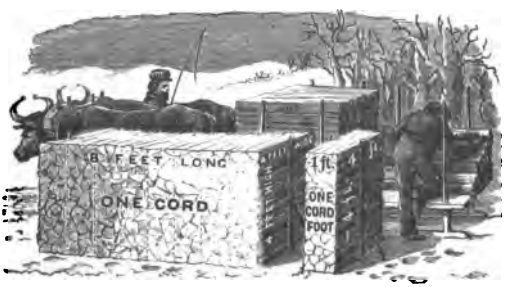
For measuring ***wood*** or ***rough stone.***

16 Cubic Feet	= 1 Cord Foot, ...	*cd. ft.*
8 Cord Feet, or 128 Cubic Feet	= 1 Cord, ...	*Cd.*
24¾ Cubic Feet	= 1 Perch of Stone or of Masonry, . . .	*Pch.*

A *Perch* of stone is 16½ ft. long, 1½ ft. wide, and 1 ft. high.

A *Cord* of wood, stone, etc., is a pile 8 feet long, 4 feet wide, and 4 feet high.

A *Cord foot* is 1 foot in length of such a pile, or ⅛ of a cord.



To find the solid contents of a rectangular solid, multiply the length by the breadth, and the product by the height or thickness.

1. How many cubic feet in a piece of timber 1 ft. square at each end and 6 ft. long?

2. How many cubic feet in 1 cu. yd.? In 3 cu. yd.? In 6 cu. yd.?

3. How many cubic feet in 1 cord? In ⅛ Cd.? In ¼ Cd.?

4. How many cubic feet in a piece of timber 1 ft. thick, 6 ft. long, and 2 ft. wide? In a piece 2 ft. thick, 3 ft. wide, and 5 ft. long?

5. How many cubic feet does a box contain that is 6 ft. long, 2 ft. wide, and 5 ft. deep?

6. How many cord feet in 3 cords? In 5 cords? In 6½ cords?

7. What part of a cord is 2 cord feet? 4 cord feet?

8. How many cords in 36 cord feet? In 40 cord feet?

9. How many cubic inches in a block 6 in. long, 4 in. wide, and 2 in. thick?

10. How many cubic inches in a 3 in. cube? In a 5 in. cube? In a 4 in. cube?

Lesson LXXV.

Circular Measure is used in measuring arcs of circles and angles.

TABLES.

60 Seconds (″)	= 1 Minute, . .	′.
60 Minutes	= 1 Degree, . .	°.
30 Degrees	= 1 Sign, . . .	*s.*
12 Signs, or 360°	= 1 Circumference, *c.*	

1 *C* = { 1296000″. / 21600′. / 360°. / 12*s.*

Miscellaneous.

Certain classes of articles are ***counted*** by dozens, and scores, in buying and selling.

12 Units	= 1 Dozen . . .	*doz.*
12 Dozen	= 1 Gross . . .	*gro.*
12 Gross	= 1 Great Gross .	*gt. gro.*
20 Units	= 1 Score . . .	*sc.*

1 *G. Gross* = { 1728 *units* / 144 *doz.* / 12 *gro.*

Two things of a kind are often called a *pair*, and *six* things *a set*; as a *pair* of horses, a *set* of *chairs*, etc.

The ***Paper*** trade use the following:

24 Sheets	= 1 Quire, ...	*qr.*	1 *B* = 4800 Sheets.
20 Quires	= 1 Ream, ...	*rm.*	200 Quires.
2 Reams	= 1 Bundle, ...	*bun.*	10 Reams.
5 Bundles	= 1 Bale, ...	*b.*	5 Bundles.

Paper is bought at *wholesale* by the bale, bundle, and ream; at *retail* by the ream, quire, and sheet.

1. How many dozen buttons in 1 gross? In ½ a gross? In 1½ gross? In 2 gross?

2. What is the cost of ¼ of a gross of buttons at 12 cts. a dozen? Of ⅓ a gross?

3. At 20 cts. a quire, what will ¼ of a ream of paper cost?

4. How many gloves in 5 pairs? Chairs in 6 sets? Score in 40? In 60? In 80?

5. How many in ½ a score? In 1½ score? In 2½ score?

6. What is the cost of a quire of paper at 1 cent a sheet?

7. In ½ a gross of pens how many dozen? How many pens?

8. How many years in three score and ten?

9. If a dress requires 3 dozen buttons, how many dozen will trim 8 dresses? How many gross?

10. What will half a ream of paper cost, at 20 cents a quire?

11. What will be the cost of half a gross of lead pencils, at 50 cents a dozen?

12. What is the difference between 6 dozen, and ½ a dozen pencils?

13. What is the difference between 6 sets of chairs, and 2½ dozen chairs?

14. Which is greater, ½ ream or 200 sheets of paper?

15. What will be the cost of a gross of pens, at 5 cents a dozen? Of 2 quires of paper, at 1 cent a sheet? Of 5 pairs of vases, at $2 a vase?

Lesson LXXVI.

MONEY.

United States Money is the legal currency of the United States.

The ***Unit*** of United States Money is the *Gold Dollar*.

10 Mills (*m.*)	=	1 Cent, . .	*ct.*	1 *E.* =	10000 *m.*
10 Cents	=	1 Dime, . .	*d.*		1000 *ct.*
10 Dimes	=	1 Dollar, . .	$.		100 *d.*
10 Dollars	=	1 Eagle, . .	*E.*		10 $.

English, or ***Sterling Money*** is the money of Great Britain.

The ***Sovereign,*** or ***Pound Sterling,*** is the *unit* of English Money.

The value of a *Sovereign* in United States money is $4.8665.

4 Farthings (*far.*)	=	1 Penny, ...	*d.*	.02
12 Pence	=	1 Shilling, ...	*s.*	.2433+
2 Shillings	=	1 Florin, ...	*fl.*	.48665
5 Shillings	=	1 Crown, ...	*cr.*	$1.2166+
20 Shillings	=	1 Sovereign, or . . .	*sov.*	4.8665
		1 Pound, ...	£.	
21 Shillings	=	1 Guinea, ...	*G.*	5.11

The *gold coins* used in Canada are the British *Sovereign* and the *Half-Sovereign*. The *silver coins* are the fifty-cent, twenty-five cent, *ten-cent, and five-cent* pieces.

French Money is the legal currency of France, and is *decimal*.

The ***Silver Franc*** of the REPUBLIC is the *unit* of French Money.

The value of a *Franc* in United States money is $.193.

			U. S. Value.
10 Millimes (*m*)	=	1 Centime, . . *ct.*	.00193
10 Centimes	=	1 Decime, . . *dc.*	.0193
10 Decimes	=	1 Franc . . . *fr.*	$.193

German Money is the money of the German Empire.

The ***Unit*** of the new German System of Coinage is the *Reichsmark*.

The value of a Reichsmark ("*Mark*") in U. S. Money is $.23⅞.
The value of the Silver Thaler " " .746.
" " Silver Groschen " " .025.

The "Mark" is subdivided into 100 Pennies (*Pfennige*).

Japan has a new and *decimal* system of coinage.

The ***unit*** of Japan money is the gold *Yen*, valued at $.997 U. S. money.

The *Coin* of Japan embraces *five gold* coins, valued at $20, $10, $5, $2, and $1. Also *five silver* coins, valued at 5, 10, 20, 50, and 100 cts., respectively.

METRIC SYSTEM.

The ***Metric System*** is a system of weights and measures based upon the *decimal notation.*

The ***Meter*** is the *unit* of length. It is also the fundamental unit, since from it every other unit of measure or weight is derived; hence the name *Metric System.*

The following are the *standard* units, from which all the other units of the system are derived:

Units.	Names.	Pronunciation.	Signification.
LENGTH.	***Me'ter.***	*mee-ter.*	Measure.
SURFACE.	***Ar.***	*are.*	Surface.
VOLUME.	***Ster.***	*ster.*	Solid.
CAPACITY.	***Li'ter.***	*lee-ter.*	Pound.
WEIGHT.	***Gram.***	*gram.*	Small weight.

Units of the higher or lower orders in the decimal scale are formed by prefixing to the standard unit,

1st. For *Higher Denominations,* the Greek numerals:

Dek'a,	signifying	Ten,	10.
Hek'to,	"	One Hundred,	100.
Ki'lo,	"	One Thousand,	1000.
Myr'ia,	"	Ten Thousand,	10000.

2d. For *Lower Denominations,* the Latin ordinals:

Dec'i,	signifying	One-Tenth,	$\frac{1}{10}$,	.1.
Cent'i,	"	One-Hundredth,	$\frac{1}{100}$,	.01.
Mil'li,	"	One-Thousandth,	$\frac{1}{1000}$.	.001.

All the metric names are accented on the first syllable.

These prefixes furnish the *key* to the whole system, since the *name* at once shows whether the unit is *greater* or *less* than the *standard* unit, and also *how many times* greater or less.

Thus, 1 deka-meter denotes 10 meters; 1 hekto-gram denotes 100 grams; 1 kilo-liter denotes 1000 liters, etc. Also, 1 deci-meter denotes $\frac{1}{10}$ (.1) of a meter; 1 centi-meter, $\frac{1}{100}$ (.01) of a meter; 1 milli-gram, $\frac{1}{1000}$ (.001) of a gram, etc.

The *Denominations* of the *Metric System* correspond to the *orders* of the Arabic Notation, and are written like decimals, or U. S. Money, the lowest denomination at the right.

The names, *mill, cent,* and *dime,* used in U. S. Money, correspond to *mil'li, cen'ti,* and *dec'i,* in the Metric System.

Hence, the *eagle* might be called a dek'a-dollar, since it is 10 dollars; the *dime,* a dec'i-dollar, since it is $\frac{1}{10}$ of a dollar, etc.

MEASURES OF EXTENSION.

The ***Me'ter,*** which is the standard *unit of length,* is the *one ten-millionth* part of the distance from the equator to the north pole, measured on the surface of the earth, and is 39.37079 in., or 1.09 yd. +.

Metric Denominations.			Symbols.	U. S. Values.
		1 Mĭl'li-mē'ter.	*mm.*	.03937 in.
10 Mĭl'li-mē'ters	=	1 Cĕn'ti-mē'ter.	*cm.*	.3937 "
10 Cĕn'ti-mē'ters	=	1 Dĕc'i-mē'ter.	*dm.*	3.937 "
10 Dĕc'i-mē'ters	=	1 ***Me'ter.***	*m.*	39.37 "
10 Me'ters	=	1 Dĕk-a-mē'ter.	*Dm.*	32.81 ft.
10 Dĕk'a-mē'ters	=	1 Hĕk'to-mē'ter.	*Hm.*	19.93 rd.
10 Hĕk'to-mē'ters	=	1 Kĭ'lo-mē'ter.	*Km.*	.6214 mi.
10 Kĭ'lo-mē'ters	=	1 Mўr'ia-mē'ter.	*Mm.*	6.214 mi.

The Metric, and some of the other tables of measures may be omitted in primary classes, at the option of the teacher.

The ***Square Meter,*** or ***Centar,*** is the *unit* of ordinary *surface* measures, and is 1.196 sq. yd., or 10.764 square feet.

	1 Sq. Mĭl'li-mē'ter.	*sq. mm.*	.00155 sq. in.
100 Sq. Mĭl'li-mē'ters	= 1 Sq. Cĕn'ti-mē'ter.	*sq. cm.*	.155 sq. in.
100 Sq. Cĕn'ti-mē'ters	= 1 Sq. Dĕc'i-mē'ter.	*sq. dm.*	15.5 sq. in.
100 Sq. Dĕc'i-mē'ters	= 1 ***Sq. Me'ter.***	*sq. m.*	1.196 sq. yd.

The ***Ar*** is the *unit* of land measures, and is a square whose side is 10 meters, and contains 100 sq. meters.

1 Cĕn'tar (*ca.*)	= 1 Sq. Mē'ter	*sq. m.*	1.196 sq. yd.
100 Cĕn'tars	= 1 ***Ar.***	*a.*	119.603 sq. yd.
100 Ars	= 1 Hĕk'tar.	*Ha.*	2.471 acres.

1. The *Meter* is used in measuring cloths and *short* distances.

2. The *Kilo-meter*, equal to $\frac{5}{8}$ of a mile, nearly, is used for measuring *long* distances.

3. The *Dĕc'i-ăr* is $\frac{1}{10}$ of an *ăr*; the *Dĕk'-ăr* is 10 a.; an acre is 40 ărs, nearly.

The ***Cubic Meter*** is the *unit* of ordinary *solid* measures.

	1 Cu. Mĭl'li-mē'ter.	*cu. mm.*	.000061 cu. in.
1000 Cu. Mĭl'li-mē'ters	= 1 Cu. Cĕn'ti-mē'ter.	*cu. cm.*	.061 cu. in.
1000 Cu. Cĕn'ti-mē'ters	= 1 Cu. Dĕc'i-mē'ter.	*cu. dm.*	.0353 cu. ft.
1000 Cu. Dĕc'i-mē'ters	= 1 ***Cu. Me'ter.***	*cu. m.*	35.3166 cu. ft.

The ***Ster*** is the *unit* of *wood* or *stone* measures, and is a *cubic meter*, equal to 35.3166 cu. ft., or .2759 cord.

	1 Dĕc'i-stēr.	*ds.*	3.53 cu. ft.
10 Dĕc'i-stērs	= 1 ***Ster.***	*s.*	35.316 cu. ft.
10 Sters	= 1 Dĕk'a-stēr.	*Ds.*	2.759 cord.

1. The square and cubic measures are only the squares and cubes of the measures of length.

2. The *cubic deci-meter* is called a *lĭ'ter* when used as a unit of liquid or of dry measures.

3. The *cubic cen'ti-me'ter* and *cubic mil'li-me'ter* are used for measuring minute bodies.

4. *The common cord* is nearly the same as 3.6 *sters*, or 36 *deci-sters*.

MEASURES OF CAPACITY.

The ***Li'ter*** is the unit of *capacity* or *volume* for both liquid and dry measures, and is 1 *cu. deci-meter*, or 1.0567 qt. liquid measure, or .908 qt. dry measure.

					Dry M.	Liq. M.
		1	Mil'li-lĭ'ter.	*ml.*	.061 cu. in.	.27 fl. dr.
10	Mil'li-lĭ'ters	= 1	Cĕn'ti-lĭ'ter.	*cl.*	.6102 "	.338 fl. oz.
10	Cĕn'ti-lĭ'ter	= 1	Dĕc'i-lĭ'ter.	*dl.*	6.102 "	.845 gi.
10	Dĕc'i-lĭ'ters	= 1	***Li'ter.***	*l.*	.908 qt.	1.0567 qt.
10	Lĭ'ters	= 1	Dĕk'a-lĭ'ter.	*Dl.*	9.08 "	2.64 gal.
10	Dĕk'a-lĭ'ters	= 1	Hĕk'to-lĭ'ter.	*Hl.*	2.837 bu.	26.4 "
10	Hĕk'to-lĭ'ters	= 1	Kil'o-lĭ'ter.	*Kl.*	28 37 "	264.18 "
10	Kil'o-lĭ'ters	= 1	Mŷr'ia-lĭ'ter	*Ml.*	283.72 "	2641.8 "

1. The *Liter* is generally used for measuring liquids in moderate quantities; the *Deka-liter*, in large quantities.
2. The *Hekto-liter* is used for measuring grains, etc.
3. Four *liters* are a little more than 1 gal.; 35 *liters*, very nearly 1 bu.
4. The *Kilo-liter* equals 1 *cubic meter*, or 1 *ster*, or 35.316 cubic feet.

MEASURES OF WEIGHT.

The ***Gram*** is the *unit of weight*, and is the weight of 1 *cu. centi-meter* of distilled water at its maximum density, equal to 15.432 grains, or .03527 oz. Avoir.

		1	Mil'li-grăm.	*mg.*	.01543 gr.
10	Mil'li-grăms	= 1	Cĕn'ti-grăm.	*cg.*	.1543 "
10	Cĕn'ti-grăms	= 1	Dĕc'i-grăm.	*dg.*	1.543 "
10	Dĕc'i-grăms	= 1	***Gram.***	*g.*	15.43 "
10	GRAMS	= 1	Dĕk'a-grăm.	*Dg.*	.3527 oz. Av.
10	Dĕk'a-grăms	= 1	Hĕk'to-grăm.	*Hg.*	3.527 "
10	Hĕk'to-grăms	= 1	***Kil'o***-grăm.	*Kg.*	2.2046 lb. Av.
10	Kil'o-grăms	= 1	Mŷr'ia-grăm.	*Mg.*	22.046 "
10 Mŷr'ia-grăms 100 Kil'os		= 1	Quĭn'tal.	*Q.*	220.46 "
1000	Kil'os	= 1	***Ton.***	T.	[illegible] "

METRIC EQUIVALENTS.

The following equivalents of the metric measures and weights agree with those established by Congress for use in all legal proceedings.

Linear Measures.

1 Centimeter	= 0.3937 inch.	1 Inch	= 2.54 Centimeters.
1 Decimeter	= 3.937 in. = .328 ft.	1 Foot	= .3048 Meter.
1 Meter	= 39.37 in. = 1.0936 yd.	1 Yard	= .9144 Meter.
1 Dekameter	= 1.98842 rods.	1 Rod	= 5.029 Meters.
1 Kilometer	= 0.62137 mile.	1 Mile	= 1.6093 Kilometers.

Square Measures.

1 Sq. Centimeter	= 0.1550 sq. in.	1 Sq. Inch	= 6.4528 Sq. Centim.
1 Sq. Decimeter	= 0.1076 sq. ft.	1 Sq. Foot	= 9.2903 Sq. Decim.
1 Sq. Meter	= 1.196 sq. yd.	1 Sq. Yard	= .8361 Sq. Meter.
1 Ar	= 3.954 sq. rd.	1 Sq. Rod	= 25.293 Sq. Meters.
1 Hektar	= 2.47 acres.	1 Acre	= 40.47 Ars.
1 Sq. Kilometer	= 0.3861 sq. mi.	1 Sq. Mile	= 2.59 Sq. Kilom.

Measures of Volume.

1 Cu. Centimeter	= .061 cu. in.	1 Cu. Inch	= 16.387 Cu. Centim.
1 Cu. Decimeter	= .0353 cu. ft.	1 Cu. Foot	= 28.317 Cu. Decim.
1 Cu. Meter / 1 Ster	= 1.308 cu. yd. / .2759 cd.	1 Cu. Yard	= .7645 Cu. Meter.
		1 Cord	= 3.624 Sters.
1 Liter	= .908 dry qt. / 1.0567 liq. qt.	1 Dry Qt.	= 1.101 Liters.
		1 Liq. Qt.	= .9463 Liter.
1 Dekaliter	= 2.6417 gal. / 1.135 pecks.	1 Gallon	= 3.785 Liters.
		1 Peck	= .881 Dekaliter.
1 Hektoliter	= 2.8375 bush.	1 Bushel	= .35243 Hektoliter.

Measures of Weight.

1 Gram	= .03527 oz.	1 Ounce Tr.	= 31.324 Grams.
1 Dekagram	= .3527 oz.	1 Ounce Av.	= 28.35 Grams.
1 Hektogram	= 3.527 oz.	1 Pound Tr.	= .37324 Kilogram.
1 Kilogram	= 2.2046 lb.	1 Pound Av.	= .4536 Kilogram.
1 Metric Ton	= 1.1023 Eng. T.	1 Eng. Ton	= .9072 Metric T.